NATURE MAGAZINE

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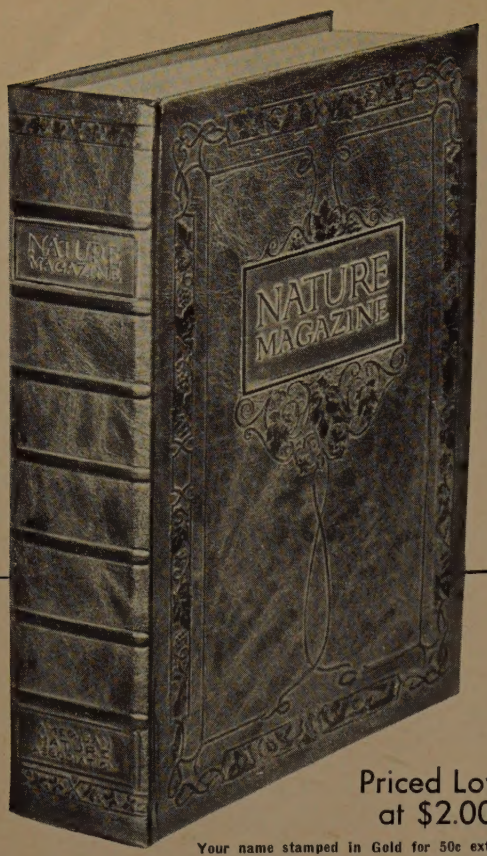

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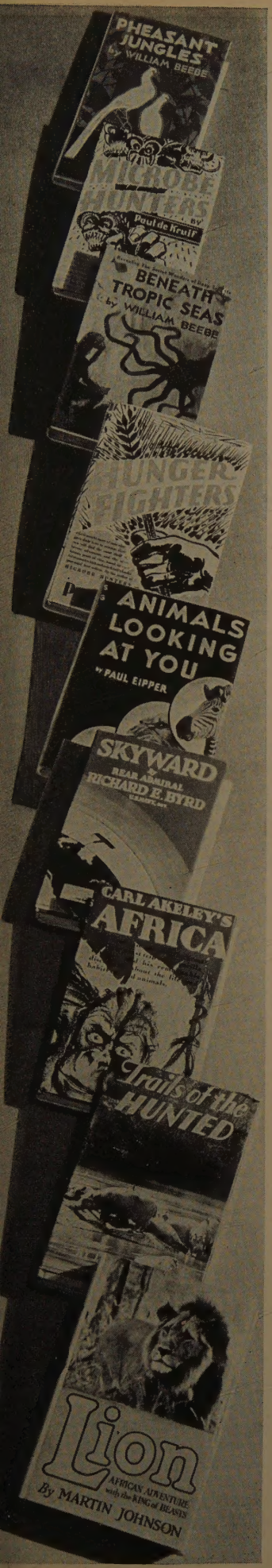

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CAVERNS, CAMERA AND CRICKETS

BY A. H. BEMIS & C. H. DAY

You can open your camera shutter to new picture possibilities, and at the same time learn much about what takes place underground by taking a brief trip in one of the many caverns throughout the country. Large caverns in limestone regions offer rare subjects in their large jewelled rooms, pearly stalactites, stalagmites and pillars, and in their few forms of distinctive animal life. A recent trip with a camera into Diamond Caverns in Kentucky was especially productive in offering interesting subjects for this fascinating type of photography.

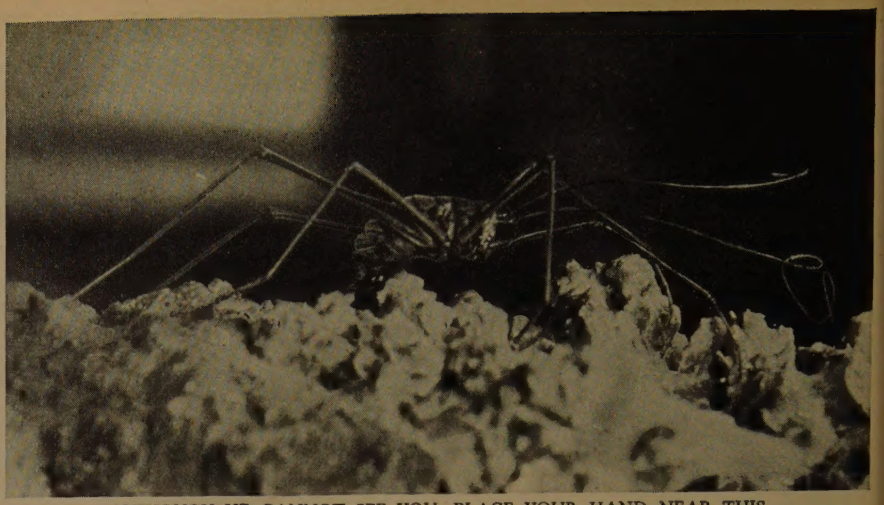
Diamond Caverns were discovered about 75 years ago by a pup chasing a coon into a hole. The dog did not come back at once. A large hole in the ground is to the people of this country something full of possibilities and worthy of investigation. The hunter went in with a rope and the cave has since been developed to be one of the most popular caverns in the area.

This cavern is one of the 2000 caves in Barren and Edmonton Counties. It is located three miles from Glasgow Junction on Dixie Highway 31 West—about 100 miles south of Louisville.

Like other caverns in the area this cave was formed by water percolating down through the layers of limestone. This surface water, impregnated with carbon dioxide from plants and leaves above, dissolves the limestone, leaving large rooms and winding passageways. It is possible that sediment carried by these waters in searching the level of the Green River may have helped in the formation of these large halls. Since the turbulent waters left, there has been a constant seeping through cracks and crevasses, dripping, and evaporation.

This seeping water carries with it dissolved limestone which is deposited again in crystal form as the water evaporates. This particular cavern has more formations per square foot than any other in the area and we were particularly interested in getting good photos of these massive gems of onyx and gypsum.

Diamond Caverns has electric lights in the main portions, as well as walks and steps. However, each member of the party carried a flashlight. One gasolene lantern was carried by each fourth member, since we intended to leave the three-quarter mile of the main passages which spread out from the one and only known entrance. Gasolene lanterns are considered safe here as free gases have never been found in the caverns, although the coal and oil in the region might lead you to expect it.



ALTHOUGH HE CANNOT SEE YOU, PLACE YOUR HAND NEAR THIS CRICKET AND HE WILL JUMP SAFELY TO ANOTHER CRYSTAL LEDGE

Our photo equipment was simple, as well as light and easy to get through small openings. We chose a regular box camera with a single lens and fixed focus. The fixed focus is almost essential since there is no light to focus with ground glass in most places and since it is hard to judge distances in these surroundings. We used regular "chrome" type roll film. The only type of light available for all areas was Photoflash lamps, since no current was at hand in some places. We could not be incumbered by entangling wires or bulky equipment. We had to have plenty of the light for dark areas and wanted the least possible inconvenience. We used a folding reflector, designed to flash from one to three bulbs at once. In no case was it necessary to flash more than two at one time. The largest stop opening on the camera was used for all pictures and it was set for time exposures. As the walls were fairly light grey, with red in some places, some of the light was reflected by the walls themselves.

Animal life in this cavern, while not abundant, is certainly interesting. There are spiders, cave crickets, transparent fish, bats, and crayfish. Almost all of them are blind, having only puckered-up tiny spots where the eyes should be.

The cricket is especially interesting. The one shown in the photo is a female cricket which lays eggs in crevices in the rock, these hatching at the constant cave temperature of 54°. The legs are about twice as long as those of an outdoor cricket. The antennae reach from the head all around the body like springs and appear to be the only method of guidance. The sensitiveness of these can be appreciated by the fact that your hand placed on the wall near it will cause the cricket to jump 15 or 20 feet and he never seems to hit anything in his jump or to land wrong side up. The antennae in the cricket straightened out when carbon tetrachloride was used in setting it up for the picture. The cave beetles have this same system of feelers but do not have any vestige of an eye.

Bats were massed in clusters on the room ceilings and the thickness of the guano beneath their resting places indicated that a great number of them lived there for a long time.

Transparent fish swam in little pools of water. Lacking equipment to put them in for a picture, we could not photograph them. So transparent are they that bones and organs in their bodies can readily be seen. These fish, only four inches long, seek darkness and shun light, although they have only vestigial remains of eyes which totally disappear as the fish gets older. Blind crayfish are also found in the cave. They are also colorless. Their vestigial eyes have no cornea. They are also considered to be deaf.

Some of the foundations were especially interesting to photograph. The light from the Photoflash lamps carried an amazing distance and the results were very clear. Glistening pillars, formed when stalactites and stalagmites meet, are colored in shades of red by their content of iron pyrites. Cave flowers of gypsum form on roofs of some rooms.

ONE OF THE MASSIVE FORMATIONS CAUGHT BY A CAMERA TAKEN INTO DIAMOND CAVERNS

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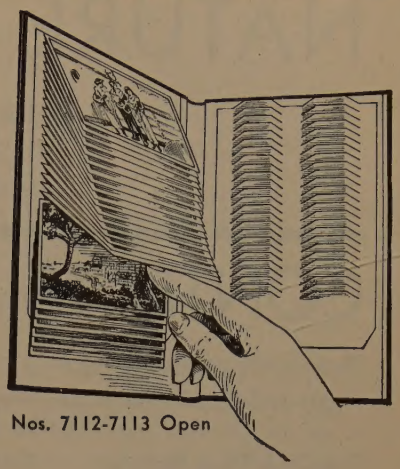

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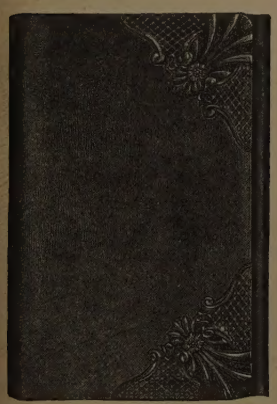

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To Stimulate Public Interest in Every Phase of Nature and the Out-Of-Doors, and Devoted to the Practical Conservation of the Great Natural Resources of America

CONTENTS FOR SEPTEMBER · 1933

Photographic Department 98
Night and Day in the White Water — Walter J. Wilwerding 103
The Duck-Billed Platypus ..... Carl G. Hartman 107
A Bear Cub in Nature's Zoo — William Metzger, Jr. 109
Nature's Airplanes ..... S. F. Aaron 110
Food by the Wayside ..... Lina Longaker 113
Conquering Adversities ..... Justin L. Rau 116
The Lake That Wasn't There .... Maurice Frink 117
The Avondbloem ..... Carol H. Woodward 119
Andy, A Mischief-Loving Crane — George L. Bird 120
Gardening—Midsummer and Fall — Romaine B. Ware 123
The Lure of Wilderness Waterways .. Fay Welch 127
A Rare Southern Lily ..... May Teressa Holder 130
The Cardinal Fights a Looking Glass — Gayle Pickwell 131
Hunting Net of the Ho-Ho-Kam .. Bruce Bryan 132
Saving Sweden's Wild Fauna — Holger Lundbergh 132
Mountains and Valleys of the Moon — Isabel M. Lewis 133
The Puddle Chorus ..... Ellsworth Jaeger 135

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NATURE AND LEISURE

• • •

WHAT WILL WE DO WITH MORE TIME AT OUR DISPOSAL?

• • •

WITH the progress of science and invention it was as inevitable as the movement of the planets in their orbits that man's ability to produce would outstrip his capacity to consume. It was equally inevitable that we should come to the time when the working day of the producer must be shortened in order that all may have the opportunity to produce. While the installation of the shorter working day will undoubtedly be attended with difficulties—including the reactionary and visionless attitude of some few large employers of labor—it is no longer something that is coming. It is here. Any other course would lead to social chaos.

Whether it be the four-day or the five-day week; the six-hour or seven-hour day, the result will be that the great majority of the American people will have more leisure. It will be a leisure founded upon a greater sense of security and a sounder confidence in the future, both for themselves and their children.

How will this leisure be spent? What use will we as a people make of those extra hours the employment of which is left to our own tastes and devising? More important, what organized development may reasonably be offered to consume many of these hours in an interesting, healthful and constructive way?

It would seem that recreation during increased leisure hours might well fall into three general groups. One of these would include amusements in which the individual participates only as a spectator. The motion picture theater and commercial sport are typical of this group. The second classification would be in the field of amusement where the individual has a part in it, principally amateur sports on the diamond, gridiron or links—recreation depending upon organization and the provision of facilities for the activity.

There remains the third group which would include outdoor activities generally. Under this head we would place hiking, hunting, fishing, camping and a great expansion of acquaintanceship with Nature and the outdoors generally. For some of these activities varying degrees of organization will be necessary; for others certain kinds of facilities must be provided.

As a people we now possess a splendid system of National Parks, immense and wonderful playgrounds. These are not, however, readily available to many for day to day leisure. At the same time there has grown up an excellent group of State Parks, easily within reach of hundreds of thousands of our people from coast to coast. This system should be expanded with due regard to serving more and more people. We have great National Forest areas, the recreational side of which has been increasingly developed and is susceptible of expansion to permit better use of the new leisure. And to the many who for various reasons have access to no public park or forest there are available, and let us hope there will long be, some tracts of natural wood or marsh, where some contact with Nature is possible and where natural objects may be viewed and studied.

Thus we have the opportunity to put existing and available resources to work in a way that they may contribute constructively to the employment of spare time. We have the opportunity to re-introduce millions of people to the outdoors and what it contains. We have the chance to develop an outdoor-minded people and to foster that interest in Nature that is latent in everybody however much it may have been stunted by the confining walls of cities or denied by the consuming demands of civilization.

This development demands organization. One of the most popular activities in our National Parks has been the creation of naturalist service. It is a work that should be duplicated in all areas where people will go to spend leisure hours outdoors. We have, in various parts of the country, excellent clubs of folks interested in Nature. These groups should grow in number and in members. Many of our school systems have splendid Nature programs that many times have resulted in the youngsters of the family leading the whole household to an active interest in Nature. This school activity should be infinitely expanded and more generally in vogue.

There are many ways in which, with leisure at our disposal, we may find health and fascinating knowledge in the outdoors. There is no need to waste this new leisure. All we need to do is to take advantage of our opportunities and reap benefits unbounded.

THE DUCK-BILLED PLATYPUS
(See Story on Page 107)

NATURE MAGAZINE

VOLUME 22 SEPTEMBER · 1933 NUMBER 3

NIGHT AND DAY IN THE WHITE WATER

BY WALTER J. WILWERDING

WITH ILLUSTRATIONS BY THE AUTHOR

THERE are many bird paradises in this broad land of ours, but few can surpass the White Water region of Southeastern Minnesota. The White Water River—or, more properly, creek—forks near the little town of Elba. One fork goes north and the other south. The valley through which it winds has been set aside as the White Water State Park, a true wilderness valley, surrounded and enclosed by wooded hills, crowned with castles of lichen-covered and juniper-grown limestone.

He who looks only for wilderness in the northern part of Minnesota is surprised to find this southern land where trout dwell in the spring-fed waters, and foxes, raccoons, and even wolves, find refuge in hollowed trees and the natural lairs formed by caves in the castled rocks. There swiftly running waters add their murmur and burble to the fluting, clink and tinkle of the feathered songsters. It is a land of furtive footsteps and flash of wild wings, and there the banded rattlesnake still dwells with his swift and sinuous cousins.

The rose and gold of evening had given place to a brilliant moon before we lit our camp-fire by the murmuring stream. We had felt our way along a single-track road to the accompaniment of the lusty burring of leopard frogs and the high "peep-peep-peep" of the peepers. What a relief to be on a road all alone—alone, as far as humans are concerned, though there was other and interesting company.

One who yearns for the whip-poor-will's call will have that yearning satisfied in this place. A half-dozen of them were going strong all up and down the creek, inspired by a full moon and a camp-fire. One with a deep bass voice held forth right back of our camp. Up the creek there was one with a tenor voice and another that was deeply guttural.

"A GREAT HORNED OWL HOOTED HOARSELY AT THE MOON IN THE SMALL HOURS TOWARD MORNING"

For continuity, nothing can beat the whip-poor-will, and before the night was over we had quite enough. Sleep was impossible, so we spent much of the time seated about the camp-fire, watching bats wheel low about us, on the hunt for insects attracted by our spot-light. There was, however, a bit of variety in the whip-poor-will's monotonous threnody when a great horned owl hooted hoarsely at the moon in the small hours toward morning.

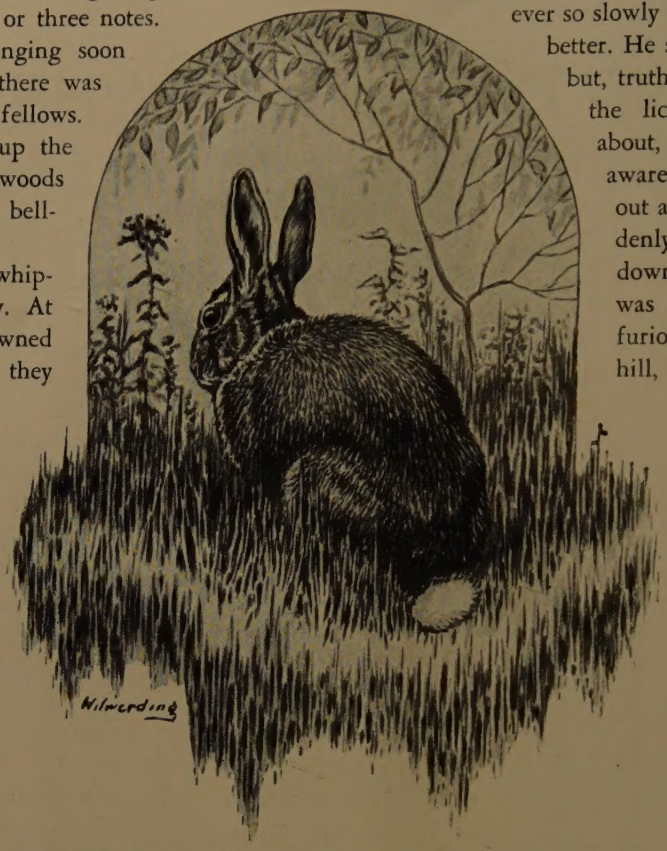
At the first suspicion of

light, when we at last hoped to woo a bit of slumber, a drummer on the hillside erased all further thought of sleep. Old ruffed grouse is still at home here, in spite of what the vermin hunters say about the horned owl exterminating him. I always think of a ruffed grouse's drumming as comparable to the sound made by someone trying to start a stubborn, one-lung gasoline engine. It usually starts with three measured thumps and then runs them all together: "Thump, thump, thump, thum-rum-rum-rum-rum-rum-rum!"

His drumming seemed to awaken a Baltimore oriole, who tried hard to flute a merry song, but made a sad, sleepy mess of the business, never getting any further than the first two or three notes. His futile attempts at singing soon roused the thrushes and there was nothing sleepy about these fellows. One after another took up the ringing refrain until the woods fairly vibrated with the bell-like notes.

All of this time, the whip-poor-wills were still busy. At times the thrushes drowned their guttural notes, but they were always in evidence when there was a lull in the singing. Soon, however, every bird in the entire woodland was shouting for the sun, and the whip-poor-wills either gave up in disgust or were overwhelmed in the deluge.

I looked at my watch. It was just four-thirty. No use trying to sleep now, so up and about our breakfast; and, while my friend whipped the stream for the speckled ones, I started away to climb a hill and see what made its home up among the castled rocks.



"HE, KNOWING NOTHING OF TRAVELING EYES, THOUGHT HIS FREEZING ATTITUDE SECURED HIM FROM DETECTION"

A woodchuck, up early for breakfast, all round and comfortable looking, sat up to survey me and show the rusty red of his under-fur, before running pell-mell for his burrow.

Crossing a dry wash, where recent rains had left a coat of mud, I found the tracks of "Br'er Coon." Then up the rock-strewn hillside, winding in and out among the sumacs at the base, listening to liquid notes of blue-jays, who, for the time, had abandoned their harsh calling for more musical notes of mating time.

But, there was something scampering about up there in a glade between two huge rock outcroppings. The glasses showed some cottontail rabbits at play. Two ran away at my approach, but the glasses searched the ground and found a pair of ears sticking up above the grasses and flowers, so I tried stalking the owner. He, knowing nothing of traveling eyes, thought his freezing attitude secured him from detection. I stalked him tree by tree and rock by rock, being careful to appear nonchalant about it; stopping at times to look about in other directions and never keeping my gaze on him for any length of time.

Soon I was within ten feet of him, sketching his attitude. One ear was toward me and the other turned away to catch sounds coming each way. At times he shifted a bit, as though relieving a cramped leg or getting in better position for a quick get-away. His head turned ever so slowly until his left eye viewed me better. He seemed to be a bit worried, but, truthfully, he looked much like the lichen-covered rocks strewn about, and one, coming up unawares, would never pick him out as a living thing. Now, suddenly, both ears turned toward down-hill and his nose, which was quiet up to now, wiggled furiously. I also looked down-hill, but saw nothing alarming, while he turned and ran rapidly up-hill.

Hoping to turn up a fox or at least a weasel I went down to investigate. There was nothing except a large blue racer, threading his sinuous way among the rocks. He was a five-footer, but surely could do no harm to an animal the size of a grown rabbit. I was sure, though, that bunny sniffed him out from all the various woodsy smells and cared not to linger and measure him. The blue racer has an odor of its own, not an offensive one, but distinct none the less. This one was a beautiful, dull French blue, with a light, greenish throat, incredibly swift of movement when I reached forward to pick him up. For a moment he coiled, vibrating his tail among dry leaves in imitation of his more formidable cousin, then, eluding me again, he found refuge among some rocks.

There was other activity in the rabbits' glade. Three of the big orange fox-squirrels were out to gather buds and catkins. One was hunting busily among the flowers, the other two in a small oak, nipping off catkins hanging down in light-green festoons. One old fellow hung by his rear feet, like a trapeze performer, and gathered a bunch of the catkins with his hand-like forepaws. When they passed each other on a limb, they stopped to spar a bit with their forepaws, chasing each other playfully

around the branch before continuing with their feeding.

The woods rang with the notes of many songsters. Cliff swallows flew swiftly about the huge rock crowns of the hill. Little wrens poured out the happiness of their hearts from nearby birches. A catbird carolled his mimic song from a topmost branch and I stopped enthralled for I had never heard one sing as well. Black and white warblers were busy looking for treasure in the bark crevices. Yellow warblers streaked about like bits of animated gold. A palm warbler sat demurely on a limb, watching me with shining eyes. Flitting from branch to branch in a secretive, searching manner, was a handsome fellow I would walk miles to see—a bay-breasted warbler. Some may have other favorites, but I think him one of the handsomest of his clan.

A flash of black and salmon showed a redstart about his affairs. A yellow-breasted sapsucker flew over to hammer on a birch tree. Close by a chickadee was busy with his acrobatics. A crow cawed raucously in the distance, while, from down the valley, near the creek, came the rattle of the kingfisher, in harsh contrast to the mournful cooing of doves.

Out in a little glade, two chipping sparrows quarrelled over a mate, while the lady flitted about in the nearby grass. The males flew at each other, fluttering in the air as though suspended on strings, but no harm seemed to be done—just a game of bluff.

Perched in a row, very sleek and iridescent, were three male cowbirds. They were at the old game of bowing and singing—if one can call their noise a song. First one spread wings and tail, bowed his head and uttered "clunk-clunk-tseee," after which he wiped his bill on the branch—first one side and then the other—straightened up to his old, sleek self and waited. A moment elapsed and the next in line repeated the performance, right down to the bill wiping. Then the third one took a turn at it. They sat and thought it over a while, flew to another branch and repeated all around.

Leaving them to their foolishness, I went down-hill to the creek. There were goldfinches, meadowlarks, downy woodpeckers, flickers, and red-winged blackbirds in their contrasting Spring plumage. A least sandpiper, piping shrilly, flew down to the water's edge and ran along with bobbing tail. A mating pair of banded watersnakes were twined about the roots of a fallen tree and I had to disturb them with a stick to watch them swim away, wicked heads held above the water's surface.

"A LONE BITTERN STOOD MOTIONLESS, LIKE A JAPANESE STATUE"

My friend, who was still whipping the stream, called my attention to some flying birds and, surely enough, there, flying about the hill-top that I had just left, were two redtailed hawks. Broad, rounded wings and fan-shaped tails outspread, they wheeled about without a wing flutter.

This is a performance that one would never tire watching. There is something wild and free about these fierce-eyed buzzards to which some inner, primitive man responds with a quickened pulse. One feels a kinship with them and a yearning to join them in their soaring.

There is talk of making the White Water a game refuge and stocking it with deer and various foreign birds, with the accompanying talk of destroying the "vermin." The vermin being, of course, much of the interesting wild life of the region—brush wolves, foxes, skunks, weasel, mink, hawks and owls. Man will never learn to leave Nature alone; not the white man at any rate. The hawks are a show in themselves; the owls, hooting at night, are part of the atmosphere of the region. What greater thrill than to hear the sharp bark of a fox or the high-keyed yapping of brush wolves.

As we watched the hawks, another larger one joined the air circus. This one was, doubtless, an old female. Her tail showed foxy red as she wheeled about. The first two soared away and left her alone, while a pair of kingbirds flew aloft and followed her into the shimmering distance.

We sat in the shade to muse and discuss the varied life that sang and flitted about us. Suddenly my friend exclaimed at the huge size of a hawk soaring down the valley. Glasses were pointed skyward while another exclamation left my lips, because the white head and tail of this huge bird of prey marked him plainly as America's national bird! He was evidently on his way to the Mississippi to see about the fishing. A swift air current carried him out of sight in just a few moments and we sat, wordless, looking at each other. It had certainly been a remarkable day for him who seeks birds!

"A HANDSOME FELLOW I WOULD WALK MILES TO SEE— A BAY-BREASTED WARBLER"

Homeward in the warm flush of the evening. There were shrikes and mourning doves on the wires and brightly-coated bobolinks in the marshes. Over a field, we saw a fierce Cooper's hawk at his hunting; at the roadside, a cock pheasant, in all his Springtime glory, spread wings and tail, while he stretched forth his head to crow: "Cuck-cawk!"

As the shadows lengthened, we passed a little pool, where a lone bittern stood motionless, like a Japanese statue, watching and waiting.

No doubt, back in the White Water, the whip-poor-wills were oiling up their throats for the night. There the sun was glowing in fading red over the water. May the whip-poor-will call there forever. We shall soon return to listen.

"A BALTIMORE ORIOLE TRIED HARD TO FLUTE A MERRY SONG"

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"A CATBIRD CAROLLED HIS MIMIC SONG FROM A TOPMOST BRANCH"

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THE BILLBOARD SLOGAN

More than one thousand different slogans were received in the contest for a brief slogan expressing disapproval of rural billboards. It was a real task for the judges, and the fact that the judges were geographically at widely separated points prevented the announcement of a decision in this issue, which went to press soon after the contest closed. Announcement of the winning slogans will be made in the October issue of Nature Magazine.

MOTHER PLATYPUS BROODING ON HER NEST, WHICH HAS JUST BEEN EXPOSED

The female has the capacity, during this period, of going into a sort of reduced animation, due probably to the lessened intake of food while caring for the eggs

THE DUCK-BILLED PLATYPUS

BY CARL G. HARTMAN

CARNEGIE LABORATORY, JOHNS HOPKINS MEDICAL SCHOOL, BALTIMORE

FISH, fowl or beast—which is it that looks up at us from the topmost part of this page? Part bird, part mammal, perhaps, one of those transitional forms of life or "missing links," now no longer missing. It is the duck-billed platypus, well known to the world through one of the most entertaining of life histories, *The Platypus,* written by Harry Burrell, the Australian amateur naturalist.

For the convenience of our readers may we refer to The Platypus by Harry Burrell, published by Angus and Robertson, Ltd., London and Sydney. It is a splendid and fascinating book, selling for twelve shillings.

As seen in the drawing of the nesting burrow in the river bank the animal is perfectly at home in the water, to which it is adapted by virtue of its webbed feet, like the duck or the penguin among birds, or the yapok, aquatic opossum, among mammals. This character, of course, is not diagnostic of either bird or beast. It is simply another example of "convergence" or adaptation of organs to perform the same function. The platypus is unique, however, among all birds and beasts, in that, hidden in a sheath on each hind foot, it has a tubular poison spur with gland attached, that renders an embrace by an enraged animal extremely serious.

Convergence is even more strikingly illustrated by the muzzle of the animal. The resemblance to a duck's bill is apparent structurally and the use to which it is put is also analogous, because the two jaws cooperate in sifting out the river mud, leaving worms and crustacea in the mouth for food. Ornithorhynchus (bird-snout) is another name and one which the "duck-bill" received because of these superficial resemblances.

More fundamental are the mammalian features which characterize the platypus, namely hair and milk glands. Teeth the adult has none; but the young grow one set, the milk teeth, soft and evanescent things, that merely

TWIN EGGS OF THE PLATYPUS IN A NEST MADE OF REED ROOTS

The eggs are always stuck together; it was some time before it was established that the platypus actually laid eggs

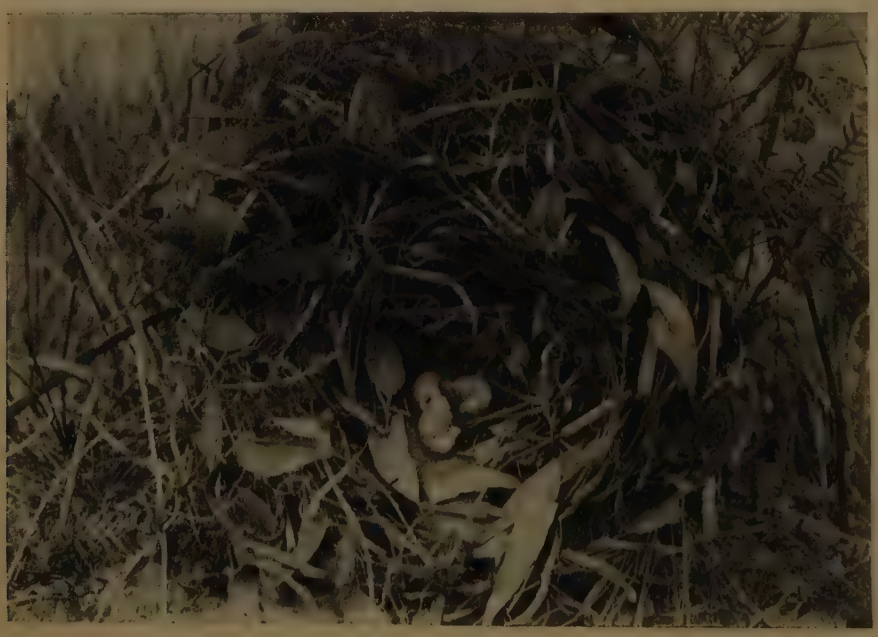
prove the possessor's relationship. By the fourth month of life they are resorbed and give way to the horny plates that screen and crunch the small animals upon which the platypus lives. One is reminded of the baleen of the sperm whale which has a somewhat similar use.

In the portrait—which we present through author Burrell's courtesy—the nostrils are seen close together on the rubber-like muzzle. The eyes are at the front end of the slits on the sides of the head; the ears are on the back end of the grooves and are covered with skin. The platypus nevertheless can hear very well because, like most animals, it reacts to sound more readily than to visual stimuli. Its sense of touch is, however, in adaptation to its food-getting habits, the most useful of its five senses. This also guides it to the tunnel entrance and about the dark passage-ways and chambers of its subterranean home.

For all the characteristics of the platypus thus far mentioned, however, the creature would receive but a passing notice. What imparts to it and its congener, the echidna or Australian ant-eater, such transcendent interest is their habit of laying eggs—actually laying eggs, made up of yolk, egg-white and shell. The proof of this fact was only recently forthcoming. Natives had reported the phenomenon, but no white man had actually seen the egg of Ornithorhynchus until Caldwell, having faith in the persistence of the native lore, in 1887 searched for and found the egg, and sent the British Association his famous cablegram: "Monotremes oviparous, ovum meroblastic." The Bushman's tradition was therefore vindicated. All doubt is dispelled by the photographs of Burrell, here reproduced—a pair of eggs and a set of newly-hatched triplets.

The male and female mate while swimming in the water, after which the sexes retire to their respective burrows. Within the female's body one to three round egg yolks about one-eighth inch in size loosen themselves from the ovary and wander down into the tube to the uterus where they become surrounded with egg-white and a membranous shell, like the larger egg of a reptile. The platypus egg is elliptical and about five-eighths inch long. There are usually twin eggs, rarely three or only one; they are laid in the nest of roots and reeds and are stuck tightly together, as shown in the picture.

The mother platypus now keeps the eggs warm with her body. She really incubates them as does a hen, a habit which need not surprise us inasmuch as it is already found among the snakes. As a matter of fact the mother platypus goes into a period of reduced animation, a kind of aestivation, due probably to lessened food intake. Both male and female are capable of "denning up"



TRIPLET PLATYPUS NESTLINGS PHOTOGRAPHED IN THE NEST WHEN ABOUT FOUR DAYS OLD

The nest is made up of gum leaves and grass. The babies take about two months to attain strength for an independent life

and sleeping during periods of food scarcity, even outside the breeding season, when they live on the blubber of their fat tail.

Meanwhile the babies grow within the egg until it is time for them to hatch. They emerge well developed, having lived at the expense of a goodly supply of food placed in the egg by the mother's ovary and uterus. But soon they become hungry like all babies and begin to wiggle and squirm against the mother's body in the region of the milk glands where they are held by the mother's tail. The milk glands are thus rubbed and irritated until the milk begins to drip from tiny pores. There is no nipple; the milk must be sucked up by the infants' lips. More and more milk comes as the babies grow. Then the mother must leave the nest to feed on luscious worms and crayfish so as to produce milk for the young, whose appetites grow to a marvelous pitch. When the young have developed a muzzle like their mother's they are taken out for swimming lessons and instruction in finding and eating their food. In a couple of months they are able to lead an independent existence.

A NESTING BURROW OF THE PLATYPUS

Upper right about 40 by 40 feet of exposed burrow is shown. B is a detail of a burrow leading to the water's edge. A is the platypus in nest. C is a nest of reed roots with eggs.

It is thus seen that in the possession of the duck's bill and the egg-laying habit the platypus is like a bird; on the basis of its furry skin and milk glands it is classed as a mammal. Perhaps the first mammals were egg layers like these monotremes. Echidna incubates a single egg in a pouch. After these came the marsupials or pouched mammals, which do not lay eggs but are born in a most unmature stage and finish their development in the mother's pouch, the opossum being most familiar to us.

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A BEAR CUB IN NATURE'S ZOO

BY WILLIAM METZGER JR.

PHOTOGRAPH BY THE AUTHOR

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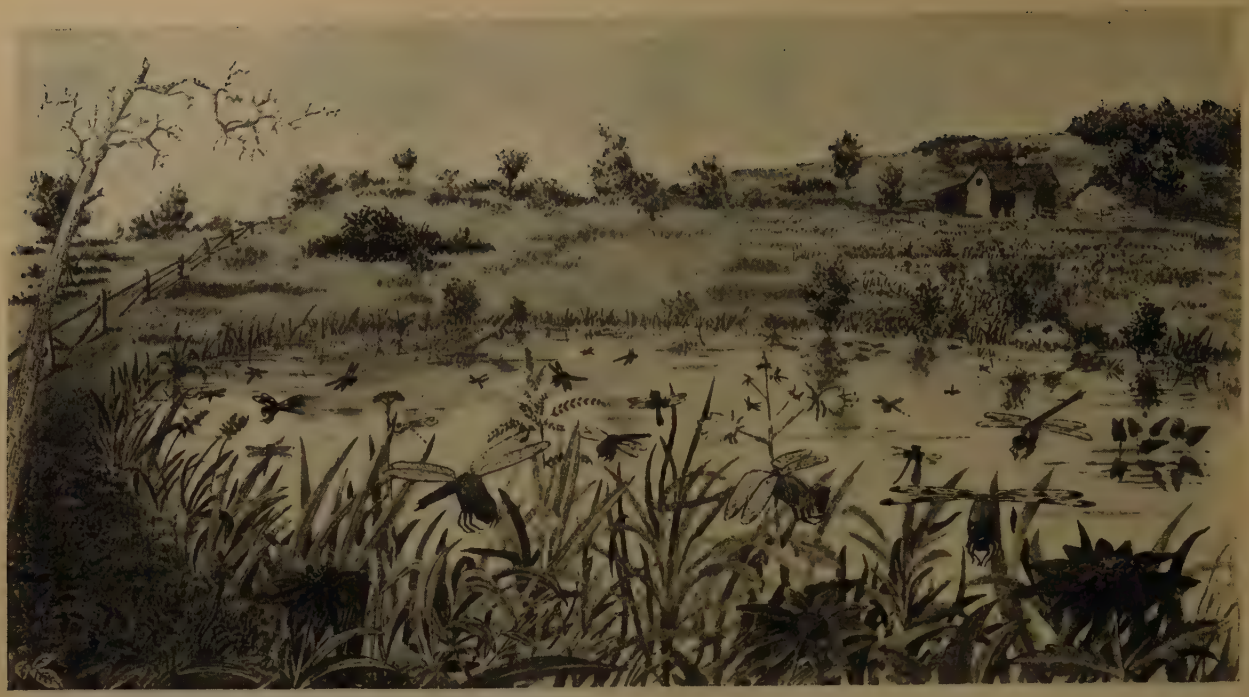
IN A patch of forest bordering the Gunpowder Falls in Maryland is a curious bark growth on a poplar tree. The tree was scarred years ago in some way and the bark has grown around the scar and tree in such a way that the growth now resembles a bear cub climbing the tree. The four paws can clearly be seen encircling the tree and one of the cub's ears can be seen on the far side. The growth has been peppered with bullet holes by gunners who have mistaken it for a cub.

While such instances as this are of interest because of the curious illusion unwittingly created by Nature, they are still more interesting because they illustrate Nature's constant work of repairing injury, whether to tree, bird or other form of wild life. Those who wander in the woods with a seeing eye will find many examples—the broken limb that has healed over, the trees that have grown together through the vagaries of woodland chance, the great tree that has grown up among the rocks or the little sapling struggling for life in a rocky crevice.



A FISHLESS POND IN THE SEASON OF THE DRAGONFLIES
A rendezvous of the colorful insects which are busily engaged in keeping smaller and troublesome insects in check and which are really helpful servants of mankind

NATURE'S AIRPLANES

BY S. F. AARON

ILLUSTRATED BY THE AUTHOR

OF THE order of dragonflies—Odonata—there are seven families that are considered by some systematists as sufficiently distinct. To other students three of these groups seem better to deserve generic placing, or at the most as comprising sub-family rank. Therefore we have in North America four types separated so clearly that the veriest tyro may recognize them at once.

It is the biplane that most closely imitates the dragonflies with their two sets of wings placed one slightly above the other. The lower set in the insect is placed well behind the upper, thus enabling them to act not merely as sustainers, but also as a motive force. The relative ease with which the insect body is made to overcome gravity permits a slight motion of the long wings to exert also the great driving force in the manner of all flying creatures. With the dragonfly the rigid anterior portion is perfectly controlled, but the pliable posterior half is only partly governed and automatically gives upward in the downward stroke, thus exerting the same force as the blades of a propeller in an airplane.

THE BROAD-WINGED TRAMEA DRAGONFLY
Life-sized drawing of one of the swiftest of the members of his family, Libellulidæ

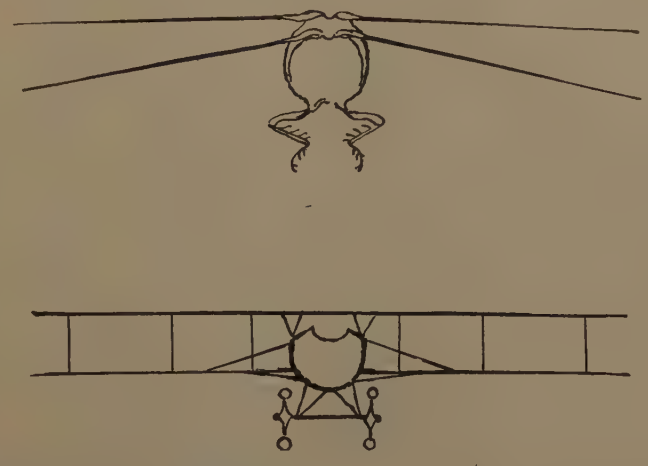
The family Libellulidæ—*Libellula* meaning a little book and applied here because of the manner in which these insects hold open their broad wings—is the most typical group of the order. It comprises large and small forms and all are swift of wing and of wide geographic distribution. Probably the swiftest member of the family, and one of the most powerful a-wing of all insects, is the not common yet ever-present *Tramea*, measuring one and three-quarter inches in length and with a wing expanse of three inches. The hind pair of wings have a broad basal patch of dark brown, which is also the color of the body.

No greater delight can be afforded the observing naturalist than to observe closely the adult habits of this alert creature. It possesses unsurpassed grace of motion, a wing control that is no less than wonderful in overcoming momentum, and, despite its lack of weight, it attains amazing speed. It is continually taking advantage of chances to capture its prey, because, like all dragonflies, it is solely predatory, feeding upon small, winged in-

sects of every order. As with insectivorous birds the benefit these insects render to man is incalculable.

This broad-winged species, as with all other members of its family, never closes its wings, but rests with them spread horizontally. It commonly frequents fishless, semi-stagnant pools which become the cradle of its offspring and where aquatic insect life is ever abundant. Also it not uncommonly breeds in the heads of brooks and creeks where caddis-fly larvæ, water-flies, water-boatmen, back-swimmers and others serve to feed the savage nymphs of all dragonflies.

Tramea also gets away from the streams and pools; thus we may find it with other allied forms in dry woodlands and fields sometimes more than a mile from the nearest water. Emulating the kingbird and the phoebe, (or can the birds, being more recent creatures, be said to imitate them?), our subject seeks lookouts or advantage points. On a bush stub, a dead briar, a fallen branch it remains motionless, turning only its big-eyed head as it awaits the passing of some winged titbit. Nearly always the swift dash that follows is successful and at once the point of lookout, or some nearby handy spot, serves as insect restaurant. Or, if the prey is quite small, it may be eaten in the air.



DRAGONFLY AND BIPLANE

A cross-section view of Nature's and man's airplanes. Below, a larger North American dragonfly—Cordulegaster—shown life-size

Most to be admired in *Tramea* is its wing power, and it is over water courses that its stunts in air are best observed. Unlike almost all other winged creatures, except certain of its related forms, it may be seen to actually fly backward during its steady hovering and in its wonderfully rapid twists in easy pursuit of its fellows it will not infrequently turn over and fly itself upside down.

The Æschnidæ is a family of dragonflies also worthy of the closest and continued study. The typical genus is *Æschna*, which means ugly, unpleasing, and except that some of the giants of the order which this group includes bear a rather alarming appearance and are often believed to be in some way harmful the name is misapplied. No more elegantly constructed insects exist. Another genus regarded by some students as a sub-family, or as possessing family distinction, glories in the high-sounding name of *Cordulegaster*—meaning that the abdomen is like a club. One species is called *C. maculatus* from the many yellow spots on its brown body, each segment of the stout thorax and long, slender abdomen bearing one or two of such marks. The wings are unspotted and entirely transparent in some specimens, in others a smoky shade. This species is one of the commonest of the larger dragonflies in many sections throughout North America, and it is of such size and character as to call attention to its darting presence. The body is more than two and one-half inches long and the wing expanse exceeds three and one-half inches.

C. maculatus is oftenest seen skimming over fields and in open woodland glades during late summer and through half the autumn, also frequently long distances from water. Though a wide traveler it possesses at times an evident attachment to a limited locality, perhaps no more than fifty square feet between certain landmarks. For several hours, if not disturbed, it will traverse this space back and forth with almost certain regularity and so swiftly that it becomes quite impossible to make a calculation of its speed, or to compare it with such other swift-winged insects, as the bee-flies, hornets and cicadas. Now and then it seizes in mid-air some winged prey, generally of the smaller kinds although sometimes such larger forms as soft-shelled beetles and bugs, ichneumons, smaller grasshoppers and even medium-sized butterflies and moths. *Maculatus* often stops to rest, perching for an hour or more with its body suspended vertically and with open wings. At such times, by a stealthy approach and the accurate sweep of the net, it may be captured. It is almost impossible to take a specimen when in flight.

Sometimes when the temperature is low, compelling insects to be lethargic, birds may capture these larger dragonflies at rest. But no bat nor bird can take them a-wing when the weather is warm, and this is generally applicable also to all of the Æschnidæ and the Libellulidæ.

Related to the Æschnidæ are the Gomphinæ, properly a sub-family. *Gomphus*, the typical genus, is the best known. The name means a nail or bolt, probably given with the idea that the thorax and abdomen resemble such an article. They are all medium-sized species, plain in

coloration with certain dull yellowish markings. They have clear or smoky wings and they may be recognized by the eyes being separated on a broadly-rounded head. The flight is not comparatively swift and they are commonly observed perched on the ground. A common form is *plagiatus*. It readily eludes the collector's net by a sidewise slip and perches again. Although the developmental stages are passed in the water, the adults are rarely seen about ponds or brooks. They seem more attached to high and dry situations and have been observed on mountain tops and in nearly arid sections.

The family of hammer-headed dragonflies—Agrionidæ—which includes the damsel-flies, are the most numerous both in species and individuals. Although they lack relative wing power their small size aids to insure the adults against discovery by their enemies the birds. The typical genus is *Agrion*, which means living in the fields and is also inappropriate, comparatively, because these insects stick closer to the water than any others. They rarely, if ever, take their small prey on the wing but from weed and grass stems.

Bright colors, partly or wholly suffusing their bodies, characterize many of the family, and some have bright spots on the wings. The males are invariably the more brightly colored. The common black or cloudy-winged "snake doctor"—*Calopteryx*, meaning beautiful wings—its body a brilliant, metallic blue, is a member of a sub-family and is probably the most observed of all dragonflies, frequenting water courses of every sort without favor.

Agrion (*Enallagma*) *civile*, the male bright blue with black spots and bands, is one of the commonest of the smaller species with a range throughout temperate North America. For the most part it frequents stagnant pools and fresh water marshes and is found even along coastal brackish water inlets. A most pleasing little insect, its slender body is not much more than an inch in length and its wing expanse about one and one-half inches. It is sufficiently agile to dodge successfully the dash of most birds and the robberfly, but it is mostly observed while perching, its body held at nearly right angles to the erect grass or reed stem most often chosen. Quite voracious, it is constantly on the lookout for its prey of small gnats and midges.

The female is dimorphic, the commonest form a bright brown, the other pale bluish-green. The act of oviposition is accomplished by crawling backward down a grass blade several inches beneath the water and fixing several eggs to the stem, the female repeating the act many times and often being in danger of capture by small fish or predatory aquatic insects. That it mostly escapes attack is proved by its abundance.

So when you see the dragonflies realize that they are things of beauty and grace; that they serve by keeping troublesome tiny insects in check; that they are deserving of your admiration and appreciation and not of a sweeping blow that will kill them. Let them dash about on bright wings.

HAMMER-HEAD DRAGONFLIES OR DAMSELFLIES
The two upper figures are the female and the male of the steel-blue damsel-fly, a familiar insect

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In the October issue two writers, absent for some time, return to our pages. They are Lorene Squire and Edward G. Reinhard. Both have an understanding of the outdoors and a faculty for translating it into words that lends outstanding charm to their stories. Miss Squire writes of a coyote of the plains and Mr. Reinhard takes us into a tamarack swamp and amazes us with the wealth that is there. Also, in October, Marion Staples Haller tells us more about the possibilities of a window jungle that flourishes during the winter; Alvin M. Peterson tells us some rather amazing things about the cowbird; and the late Fred E. Brooks introduces a beetle that is smart but pestiferous. And that is not all that the October issue holds of interest, including a splendid garden article by Romaine B. Ware; another practical article in the camping series; the monthly story of the heavens by Isabel M. Lewis, and a delightful story by Marjorie Shanafelt for the readers of Uncle Dick's Department.

THE MORELS ARE EDIBLE
They are easily recognized because of their sponge-like surfaces and are usually found in damp places or on sandy banks

PHOTOGRAPH BY GUY CARPENTER

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FOOD BY THE WAYSIDE

BY LINA LONGAKER

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Conditions have brought about, in many parts of the country, a practise of gathering mushrooms to add to the menu or of buying them from door to door salesmen. Some unfortunate results have come from this because of ignorance of the edible and the non-edible species. One of the most delicious additions to the menu may be one of the edible mushrooms properly prepared, but the housewife should know which is which. Here the author describes some of the more common and safe mushrooms one can easily learn to know.

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ONCE in gladiatorial days, a senator went a-gathering mushrooms. He picked, alas, the wrong kind. If he had had a little more knowledge, or a cast-iron constitution, perhaps history would be written differently. But the mushrooms did their work and, like senators, have had a certain reputation ever since.

In fact, so long has the world shouted "toadstool, toadstool," when a mushroom was sighted, that most of us are quite content to pass by on the other side. Yet knowledge is easily obtained about half a dozen of the more common species that may be found growing almost everywhere in the late summer and all fall. Delicious meals may be the result.

Once the quest for mushrooms has begun, the shortest walk becomes an adventure, because there has been added to it the possibility of a great find. There's a tang and flavor to one's own hand picked mushrooms that only a fisherman, who has caught and browned his first trout, can adequately explain.

SHAGGY MANE IS DELICIOUS
It is often found growing right beside one's house

There is one rule to be kept constantly in mind by him who sallies forth for mushrooms, and let him blazon it on his knapsack: *Never pick or eat any mushroom that cannot positively be identified.* Then there is no danger of sharing the fate of the Roman senator.

To learn to identify the common varieties is only the matter of a little study. There are no "tests" except knowledge that are useful. Contrary to popular belief, not all mushrooms that peel are edible. Nor does the presence of insects on a mushroom prove that it is fit for human consumption—in fact, quite the contrary, because infested specimens usually are old and not appetizing, even if safe. There is no alchemy of cooking that will turn a poisonous plant into an epicure's delight, and those who have put in practice the belief that salt or an onion slipped in the pot with an inedible variety will change the wolf to a lamb are either dead or very lucky.

The second rule for the mushroom gatherer to write large on his

knapsack is: do not pick the young mushrooms when they look like little buttons just poking their heads above the ground. At this time they are most dangerous. The adult plants are the only ones that should be taken.

Probably no mushroom is better known than the common field mushroom, the *Agaricus*, which is the one most generally grown for commercial use. Unfortunately it is easily confused, by those unfamiliar with its characteristics, with that deadly mushroom, the destroying angel, *Amanita phalloides*. There are many ways, however, of distinguishing the two. The under part of the cap or the gills of the destroying angel is always deathly white, while the field mushroom is brown or pink underneath except in the very young specimens. In addition, at the base of the stem of the *Amanita* there is a cup, sometimes resembling a large bulb, sometimes flattened out into a thin fringe. It is the death cup, or, technically, the volva. It bodes ill and is always present in this poisonous species. Occasionally, however, it is buried underground, and care must be exercised to find it. Another identification mark of the poisonous species is the veil, which the destroying angel wears as though to hide its true nature. It is a thin film that hangs from the inside of the cap. In older specimens one must watch carefully, because it dries up so that there are only traces of it left. In the younger specimens the cap is usually smooth, but as it ages little patches appear upon its surface.

THE MOST POISONOUS OF MUSHROOMS

The destroying angel, Amanita phalloides, which has definite characteristics. Below is a group of the common field mushroom which is also popularly grown commercially. Learn the difference between these two

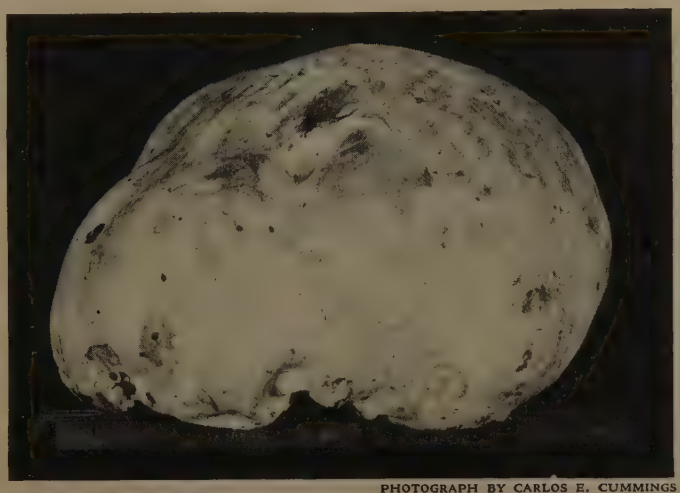
The *Agaricus* grows everywhere, along the roadside, in the backyard, or in the field. Its favorite haunt is in old, closely-cropped pastures, where twisted apple trees grow. So universal is the *Agaricus* that immigrants from Europe rejoice at the sight of it as something they knew at home. History tells us that even the old Romans praised its flavor. It has a smooth, mealy, white, bell-shaped cap, with gills that are delicately pink in the younger specimens, and turn brown with maturity. The chubby fat stem is encircled with a delicate ring. Once identified it can never be mistaken, particularly if one remembers, always, that underneath it is pink or brown.

PHOTOGRAPHS BY CARLOS E. CUMMINGS

If one hesitates to gather the field *Agaricus* because of the dangerous masquerader, there are any number of other mushrooms that may be positively identified, and which resemble no poisonous specimen. One of these is the puffball. If, while on a walk, one finds a big white ball, as large as a football, he may indeed rejoice, because his discovery is an edible puffball. Both the outside and inside are firm and white. As the puffball grows older this meat turns brown and becomes crumbly, and in this state is not edible. The small puffballs, about the size of a golf ball, are also very tasty. They grow in clusters from a short, stem-like base. Both varieties are very easily cooked. They need only to be washed, sliced and fried in butter.

As easily distinguished as the puffballs are the morels. They look like little sponges growing on a stem, and when parboiled and fried, or stuffed and baked, they are delicious. One finds them in damp places and on sandy banks. The plants are brittle with a short stem. The upper part is conical and prominently ridged with irregular depressions or cavities, a most distinctive character.

If one will think back to his childhood, he will probably remember pushing over on the lawn clusters of silvery, bell-shaped "toadstools," the older specimens of which seem to dissolve into an inky fluid. These were specimens of the inky *Coprinus,* which is most delicious. The best known of the species is called "the inky cap." It grows everywhere from spring until fall, but it is most plentiful in the autumn. The gills beneath its bell-shaped cap are broad, crowded and white. They soon turn pinkish and finally black before they dissolve into a black liquid. The stem is hollow, smooth shining, and whitish.



PHOTOGRAPH BY CARLOS E. CUMMINGS

THE GIANT PUFFBALL NO ONE CAN MISTAKE

This specimen was nearly a foot long. Below is Coprinus, an almost cosmopolitan mushroom which is easily distinguished and makes good eating

The shaggy mane belongs to the same genus and is just as easily identified. It is larger than the inky cap, which is really a tiny mushroom, and has, on a larger scale, the same marks of identification, except that there are scales on its cap from which it gets its name. The cap, too, is bell-shaped and hugs the stem like a closed umbrella. Occasionally the cap is whitish, but usually it is rather yellowish. The gills are

crowded and broad and change into the same inky fluid when old. Like the inky cap the stem is hollow and has a thin, moveable ring.

There is one other mushroom that the seeker for the edible varieties should include in his food list, the oyster mushroom. It is one of the delicious varieties that grow on fallen logs and old stumps. During one season it may appear on the same stump several times, so when an "oyster log" has been located, it pays to visit it frequently. The oyster mushroom is gregarious and comes out in big clusters almost without a stem. The caps are distinctly shell-shaped with a moist, soft surface, that varies in color from brownish ash to yellow. The gills are white and run down the almost imperceptible stem. With its tender part dipped in egg, rolled in bread crumbs, and fried as an oyster, one does not wonder that some forgotten enthusiast christened it "the shell-fish of the forest." It truly is.

THE OYSTER MUSHROOM IS COMMON
Growing from old stumps, it may be added to the home menu with safety and satisfaction

If the beginner in mushroom lore will confine his gatherings to these six varieties, the common agaric, the puffballs, the morels, the inky coprinus, the shaggy mane, and the oyster mushroom, he may pick to his heart's desire, and eat some of the best food known. These six varieties are quite universal in their distribution, and a few hours' study makes their identification sure. They are among the easiest of vegetables to prepare. They are always good, if first parboiled, and then fried or creamed. The liquor in which they are cooked should not be thrown away but used in soup.

As soon as one begins to look for mushrooms, he finds that a soft fall rain brings them out almost as surely as it does the angleworms. Indeed, as one learns to gather the more delectable ones, he feels that the promise to the Israelites is again fulfilled: "Behold I will rain bread from heaven for you, and the people shall go out and gather."

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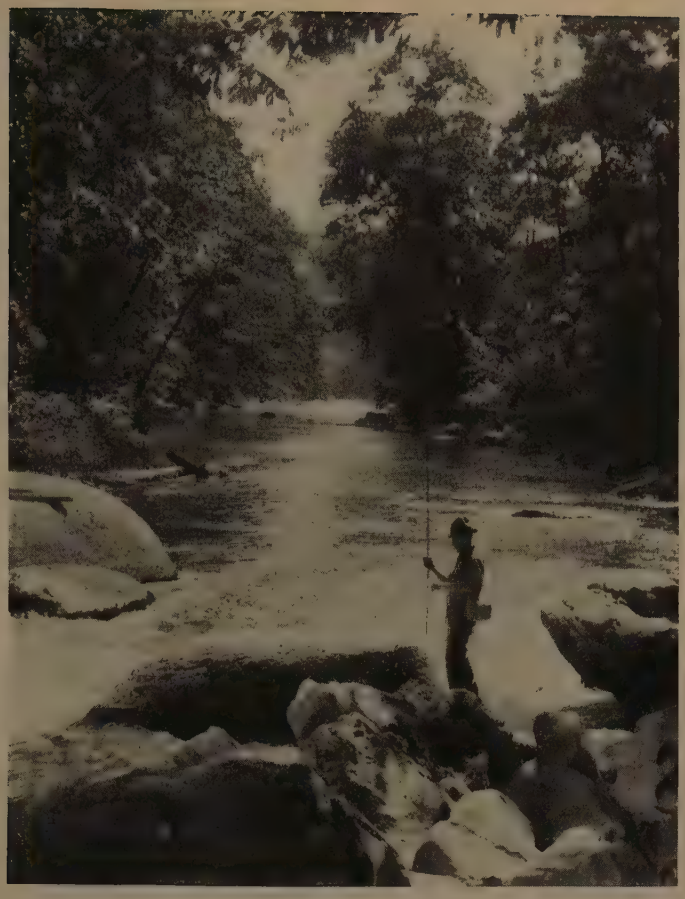
CONQUERING ADVERSITIES

TREES WITHSTAND DYNAMITE AND ROT

BY JUSTIN L. RAU

THESE two trees have had enough difficulties to kill a dozen, yet both are flourishing. The right-hand trunk is that of a white oak near the top of Pilot Knob in Missouri. Dynamite drove granite pieces from a nearby rock quarry deep into its sides, yet it still lives, its wounds healed. The other tree is a sycamore beside the Current River in the same state. The four foot stump of the parent rotted away, leaving but a thin section of sapwood at one side. From this, four feet above the ground, rises the new tree, eight inches through. Yet life is most persistent.

"SUPPOSE YOU ARRIVED WITH HIM AT A STREAM AND DISCOVERED THERE THAT, THROUGH SOME MISCHANCE, EVERY BIT OF YOUR FISHING EQUIPMENT HAD BEEN LEFT AT HOME?"



"WHAT WOULD HAPPEN? WOULD YOU CURSE A BIT, KICK A TIRE AND SLAM THE CAR DOOR A COUPLE OF TIMES, THEN DRIVE WEARY MILES BACK TO YOUR STARTING POINT?"

THE LAKE THAT WASN'T THERE

BY MAURICE FRINK

THERE are many ways to test an outdoor man—by the shoes he wears, by the way he builds a fire, by the pack he carries—but this is a sure test:

Arrange to have it rain steadily the first two days while you are on a camping trip together; have it clear off at sundown of the second day, and then start cooking your first meal outside the tent. Get the grub all spread out, the fire going good, the bacon sizzling and the coffee just at the point where its fragrance begins to scent the camp. Then have it suddenly cloud over and rain again—have it rain hard—in the bacon, in the coffee pot, in all the dishes, on your blankets spread out to dry, down your necks, and everywhere.

Does your partner still smile? If he does, stay with him; he'll do for the trip—and for any other trip.

But I know a simpler way to test the mettle of an outdoor man. It is to find the answer to this question: If he went fishing and forgot to take his tackle, could he still enjoy the day?

Suppose you arrived with him at a lake or stream, just when the bass or trout were rising, and discovered there that, through some mischance, every bit of your fishing equipment had been left at home. What would happen? Would you curse a bit, kick a tire and slam the car door a couple of times, then drive the weary miles back to your starting point? Or could you both stay right there at the fishing grounds, without so much as a hook and line—and have a good time?

Well, I have never been put to the test, nor have I ever seen it applied to anyone else. But I have wondered about it. And I am sure that I know one man at least, among the fishermen of my acquaintance, with whom I should be happy to be when such a test came.

Just the other night I heard this chap, in a group of men discussing their hunting and fishing trips, mention the fact that he had been "on the lake at daybreak yesterday, in the snowstorm."

"Get any ducks?" someone inquired.

"O, I wasn't hunting," he replied.

"Fishing so late in the season?"

"No—I was just out there."

The hunters and fishermen looked at him puzzled; they thought he was holding something back, concealing his real motive for being out on a lake at daybreak in a November snowstorm. But I knew that he had told the simple truth. I knew that he did it "just to be out there."

And that is one reason why I like to go places with

"NATURE'S MUNIFICENCE BESTOWED ON MEN WHO FISH THEIR STREAMS EMPTY AND LET THEIR VERY LAKES DRY UP."

that man. He is one of those to whom the outdoors means a great deal more than fish on a stringer, or a deer head on the wall.

He is an outdoor man, from his sun-burned neck to the hob-nails on the soles of his boots. He knows more about trees and birds in a minute than I shall ever be able to learn. He has as good a time whether the fish "take hold" or not; rowing the boat for my casting gives him as much pleasure as casting while I pull the oars. He prefers to do the cooking, and he always has another piece of chocolate in his pocket.

Nor is there ever any danger of losing him in the woods. He has affection for wild growing things such as many men have for dogs. A tree, a tiny bird, a spring flower, are personalities to him. To see a baby evergreen being suffocated by a vine or weed, or to see a slender sapling trying to grow beneath some old dead tree, hurts him as it would hurt to see a crippled puppy. And he is as quick to aid the one as he would be to help the other.

On a woods journey he is forever turning aside from the trail to lift a deadfall off green grass and toss it to some barren spot; to tear a smothering vine from a little spruce tree; or to push over a decayed and useless stump that mars a view or blocks some living vegetation.

Thus his progress through the woods is a series of crashes and scrapings, as stump or windfall is brought to earth. I may become separated from him in our wanderings, but never for long; because if I listen quietly a few moments, somewhere I will hear a rotted log dragged down or scraping through the brush. And I will know that my friend is at work nearby, helping some bush or tree or plant. And I love him for it.

He it was who helped me discover Goose Lake.

There are a hundred lakes in that Michigan country, and we knew many of them. But Goose Lake was one we had never seen or heard anyone speak of; yet there it was, on the latest county map, a pinhead spot of blue, far back from any main road and full of possibilities.

Here, perhaps, was the lake we had been looking for so long. This might be where the Big Ones lay, unknown to the world, waiting for two explorers to find them. Dreaming of the discoveries we might make, we planned one winter to prospect it ahead of the spring fishing.

So on a day in March we drove to the crossroads village three miles from the little blue spot on the map, left our car parked by the store and hiked cross-country toward Goose Lake. It was a raw morning, gray and chill. The woods were bare and bleak, the fields were frozen and unfriendly to our boots.

We crossed side roads, reached an abandoned gravel pit, turned north as the map directed, and, after tramping many a barren hill and meadow, we stood on what the map told us should be the rim of Goose Lake. Ahead of us was a bowl-like hollow, with a sort of icy floor through which projected here and there rough clumps of dwarfed willows. Naked aspen rimmed the hollow, and there were pussy-willows in their first brave bloom. But there was no lake.

A dog barked suddenly from some bushes in a deeper part of the bowl. There was the sound of axe on log. Then a man emerged, a swarthy-faced young farmer, setting traps.

"Goose Lake?" he answered. "Sure, you're in it."

He grinned, and then explained:

"There hasn't been any water in Goose Lake for twenty years, but this is where it used to be, when there was any. I mind the time when they rented boats, right over there, and men fished all around here. I was just a kid then. I don't know where the water went to, but it's gone."

So we tramped back to the village, and our car, by way of wind-swept roads where juncos flittered their white tail-feathers at us from dead trees, and the bright green of the sassafras sprouts promised the com-

"A COUNTRY STREAM THAT MAY OR MAY NOT HOLD FISH BUT WHICH OFFERS MUCH ENCHANTMENT TO HIM WHO KNOWS HIS OUTDOORS."

ing of another spring—Nature's munificence bestowed on men who chop down the woods, kill off their animals, fish their streams empty and let the lakes dry up.

No, fishing tackle is not essential to the success of every fishing trip.

But it is a bit disappointing to go to a lake, and find that even the lake is no longer there.

"NAKED ASPEN RIMMED THE HOLLOW, AND THERE WERE PUSSY-WILLOWS IN THEIR FIRST BRAVE BLOOM. BUT THERE WAS NO LAKE."

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THE AVONDBLOEM

BY CAROL H. WOODWARD

When the lengthening days of September bring spring to southern Africa, the marshlands offer a sight to be found on no other continent. There grows the avondbloem, or yellow marsh africander, which, always facing east, in late afternoon draws the rays of the lowering sun through the transparent edges of its upper petal, setting the bogs, like the sky itself, aglow with an eerie light.

The sun sinks, and a powerful fragrance pervades the air, an intoxicating, lily-like odor, which remains through the night, to disappear again with the rising of the sun in early morning.

The peculiar sensitiveness of this flower's fragrance to light and darkness has been brought out astonishingly by laboratory methods. When John Scheepers of New York presented to the New York Botanical Garden some of the bulbs he had imported from South Africa, Dr. Forman T. McLean did some experimenting with the flowers. He found that electric lights were even more powerful than sunshine in killing the night-time odor. In twenty minutes the fragrance completely disappeared when a blossom was held under a reading lamp containing two fifty-watt bulbs. In a lecture hall lighted by white-globed ceiling lights, half an hour's exposure removed the fragrance. On the other hand, the perfume became as powerful as at night when the plant had been set for half an hour in a photographer's dark-room.

This delicate, greenish-yellow blossom springs after long, cool and rainy winters from lowland bogs which become completely dry in summer. It is perhaps for this reason that the leaf, which at first is normally flat, virtually turns itself inside out as hot weather advances, until its two edges meet and fuse in such a manner that the ultimate shape is that of a Maltese cross. It is apparently thus enabled to withhold much of the moisture which the sun would otherwise draw from the flat leaf surface.

In its native home this "africander"—whose official name is *Gladiolus tristis*—flowers in September; when raised in North American greenhouses, however, it is so upset by the change to a northern latitude that it does not blossom until February.

ANDY, A MISCHIEF-LOVING CRANE

HIS BOYISH HEART TOOK HIM TO JAIL AND THEN INTO EXILE

BY
GEORGE L. BIRD

PHOTOGRAPHS
BY THE AUTHOR

ANDY DRESSED FOR CALLING

He grew more and more handsome as he took on the wisdom and mischief of added months and was most careful in his habits

You would hardly look for a sense of humor in a crane, and much less expect a crane to be arrested, sentenced, and imprisoned for being a public nuisance. And undoubtedly you would attach the title of Ananias to anyone who told about the crane going on a hunger strike because of his imprisonment. Yet—and here's another for Ripley—it's true.

Andy is a sandhill crane of great dignity, who was named Andy Gump for reasons revealed by his photos. He frequently visited my home in northern Florida until his pranks sent him into exile to the remote estate of Royal Dixon, the naturalist, near Keystone Heights, Florida.

At the time of his arrival from his birthplace in the Everglades, he was a youngster of a few tender months still dressed in down and pinfeathers. Before he was able to satisfy his enormous appetite unaided, he learned to depend upon and cherish his charming mistress, who lived by a lake near my own home.

One day his mistress left the state on a visit. Andy thereupon called on a retired minister living nearby. Whether he went to improve his morals or to while away the lonely hours is not clear, but it helped to land him in jail.

The minister was setting out onions in long straight rows. Andy followed him closely and entirely unobserved, pulling up the onions one by one. When the minister straightened at the end of the row, it would have been difficult to tell whose dignity was the greater. But it was the man's composure that first succumbed, and Andy escaped only by taking wing.

The onion sets were replanted, but the next morning they had again been pulled up. No one saw Andy do it, but the blame centered on him.

After that the incident that led up to his disgrace was not long delayed. Across the lake were kept a few chickens that from time to time roamed down to the lake shore and fed there. From Andy's point of view they were poaching on his own private hunting grounds.

One evening he was seen giving them a careful scrutiny. The next morning the entire flock was found dead. Each one of the chickens had been killed in the same way, apparently by a very sharp round-pointed instrument.

It couldn't be shown that Andy killed the poachers, but circumstantial evidence and his growing bad reputation proved too strong. He was now arrested and imprisoned. But the city fathers reckoned without Andy.

The crane promptly went on a hunger strike. He refused to eat and drink. Since there is no known way of force-feeding a crane, Andy grew thinner each day. In three days he was but skin and bones, and his emaciated body soon matched his elongated legs and neck.

The city marshall notified the city fathers. An emer-

gency meeting was called. The debate grew hot, but it could end only in one way.

Andy was released, and he stalked away without a backward glance, taking his offended dignity and his victory with him.

Yet at home he was a docile and an amusing pet with a broad sense of humor and a bagful of tricks, both playful and otherwise. He thoroughly enjoyed three roly-poly pointer pups that frolicked with him. Although he was only a little more than two months old when he came, he soon learned his name. His grayish-blue body gradually changed to a slate blue in maturity, though there was no time when he did not seem all legs and neck.

When he arrived, he weighed about four and a half pounds and stood just twenty-five inches, which is about right according to insurance charts in crane circles.

Of his own choice he never touched fish; instead, he pursued crickets and grasshoppers, or the water beetles and the tiny sand beetles that make the beautiful mole-like tunnels in the bed of the white sand-bottomed lakes. Tiny frogs and mole crickets were dainties that he eagerly hunted.

Strangers were often afraid of his bill, which was fully five inches long, needle-pointed, and manipulated by a long and extremely muscular neck. I have seen him thrust it into the sand nearly to the eyes countless times in probing for a mole cricket or a burrowing beetle.

It is not strange that stray dogs and cats shunned his neighborhood. No animal seeing him come with head down, mouth open, and wings widespread hesitated long. This trait had its good points, though his greatest usefulness came through his appetite, which kept the insects thinned out to a minimum.

Though I never saw him battle a snake, his methods were described to me several times. They must have been instinctive, because he never had the chance to observe his relatives. He pounced upon it with both feet, kicking out right and left. He followed that with a lightning thrust of his head, catching the reptile back of the head and crushing its neck, at the same time flinging it away with a snap of his long neck. He repeated this until no life was left.

As has been indicated, Andy had more than one trick in his bag. But there was one of his stunts that had a flavor of its own and which was probably the strongest link in the chain of circumstances that hastened his exile.

A SOMEWHAT WOEBEGONE LOOKING BIRD
For nearly six months after he was born Andy looked decidedly motheaten in his feathered clothing

His nearest neighbor lived only a few rods away. For some unknown reason—which may have been perfectly understandable to a crane—he took a dislike to the housewife. From week to week it was his pleasure to wait until Monday morning when the washing had been hung out and the members of the family had disappeared within the house. Then, appearing from concealment, he swiftly walked to the prop that upheld the clothes, pulled it loose with his powerful bill, and left the flapping garments to flutter to the ground about him. After which, he would again disappear into the woods.

This was bound to lead to trouble sooner or later, but try as his guardian did, she never succeeded in breaking him of this habit. He had another amusing and annoying trick, however, that was not quite so malicious as soiling the Monday wash.

Seeing a lady hiker ambling along he would plant himself in front of the woman and attack the bright buckles on her shoes. Retreat was the only recourse, and retreat it would be. This happened many times to pedestrians of that sex. Once having put them to rout, Andy followed up his advantage, stalking after his enemies for blocks to see that they did not attempt a return.

Though he had many delightful traits and displayed affection for his master and mistress, he could not be saved in the end. Despite the fact that he learned to recognize the family car while it was blocks away and often

ANDY AND HIS FAMILY, BOTH HUMAN AND CANINE

He learned tolerance from the three pups and adored his mistress. Below, he engaged in the business of chasing bread crumbs. He was built for wading and loved the water

came running to greet it, despite the crazy dance he performed for his owners alone by hopping into the air repeatedly as he flapped his seven-foot wings, his jokes could not be overlooked.

Antipathy against him grew because his neighbors did not recognize that he was a man-about-town and should, therefore, be treated with the consideration due a bird of distinction. For instance, his social calls were always conducted with great dignity — though less can be said for his human friends.

Once he came unbidden to a fashionable neighbor's afternoon tea. Being young and comparatively inexperienced, he had not learned that "all is not gold that glitters." He tried to collect whatever buttons and buckles were loose. And it is said that he sampled the tea and cakes—but that may be mere slander. Anyway, the party broke up at that point.

Most women didn't appreciate him because he was too ungainly to be cuddled in their laps and he resented baby talk. Men tolerated him because he destroyed insects and was a good watchdog. He loved little children and played peacefully with them by the hour. But parents remembered the old saying about "birds of a feather," and forbid their offspring to associate with him.

So he was banished to the home of a naturalist a few miles away where his dignity and his sense of humor are better understood and where his wise nature is being studied for the benefit of future generations.

PHOTOGRAPHS FROM HITCHINGS AND CO. AND LORD AND BURNHAM

LEAFLESS TREES OUTSIDE BUT ACTIVE GROWTH WITHIN

Small greenhouses add a garden interest and resource worth far more than their moderate cost, even the little "lean to" greenhouse is a guarantee of winter garden joy

GARDENING—MID-SUMMER AND FALL

BY ROMAINE B. WARE

COULD gardeners but realize it, the advent of mid-summer, rather than ending the garden making year, is really the beginning of a most important planting season. All too many home gardeners work upon the theory that spring is *the* planting time, and while for many things this is true, there are some important plant groups that transplant to best advantage between mid-summer and the final freeze-up. Practically all spring-flowering bulbs can be planted at no other time, and the great family of peonies is generally conceded to transplant best in the fall. Experts tell us mid-summer and early fall are the most satisfactory seasons for setting iris plants.

This is the first of two articles by Romaine B. Ware, Garden Editor of Nature Magazine, designed to be helpful in a practical way to the gardener in midsummer and fall when many are likely to overlook possibilities. Together these articles will be valuable for reference. The second article will appear in the October issue.

These three plant groups are merely the beginning of an extensive planting campaign which may profitably be carried on during the last third of the garden year. In fact this is a far more suitable time to start a garden than the spring season, and its possibilities should be considered.

Spring comes with a rush in many sections and there never seems to be enough time to accomplish everything one desires. During the last third of the garden year, however, things are different. Plant growth is less active. Generally speaking, the weather is better, and there is usually more time because fewer details demand attention. Good gardens are not made in a hurry. Intelligent planning requires more consideration than is possible during the bustle of spring. Also, with the garden in full bloom and memories of the last three or four months vividly fresh, we are better able to visualize results than at any other season.

Garden planning in mid-summer can take in a wide variety of undertakings. Construction and planting projects, which in the spring would hardly be possible, may be contemplated at this time. Formal gardens, wall and

GARDENS ALL IRISES OFFER WONDERFUL POSSIBILITIES

Hundreds of different and colorful varieties may be blended into an entrancing picture of constant bloom

water gardens, pergolas, shadow houses, fences, walks and drives are among the many construction features possible. Preparations may be made for rose gardens, shrub borders, bird sanctuaries, hedges, windbreaks and screens of trees, wild gardens and special gardens of such things as peonies, irises, bulbs, lilies and many others.

One of the most desirable construction jobs is the erection of a greenhouse to outwit onslaughts of Jack Frost and lengthen the growing year to the full twelve months. Several practical houses are now available at reasonable prices. Late summer or early fall is the time to put up these houses in order that they may be ready to care for plants before the cold weather comes.

The garden planner at this time should pay attention to things that may be planted now most advantageously. Irises unquestionably form the most important flower group. With the vast variety from which to select and the tremendous improvement in them during the last twenty years, every garden should add some new ones. Good irises have never been so inexpensive. A few dollars, carefully spent, will today buy a dozen fine irises that only a few years ago would have cost three to six times as much.

Here are a dozen and a half good irises priced most attractively today. This selection offers a good range of color, and if you are not already growing some of the better irises these will give you a wonderful show.

Bruno
Candlelight
Citronella
Coppersmith
Coronation
Dolly Madison
Duke of Bedford
Folkwang
Germaine Perthuis
Mary Barnett
Midgard
Moonlight
Mrs. Marion Cran
Santa Barbara
S. de Leotitia Michaud
True Delight
Vesper Gold
Wedgewood

The sooner you plant irises after July 15 the better the results. This applies not only to new acquisitions, but also to transplanting your present plants. Almost without exception irises should be taken up, divided and replanted at least every third year. Better blooms will be the reward. Old plants become so crowded they strangle themselves. Dig them up, shake off all soil, pull or break the plants into small divisions, cut back the leaves to a few inches from the root and replant.

In planting irises the fleshy roots or rhizomes, should be hardly covered at all. In fact, their natural method of growing is about half out of the ground. Planted too deep their growth is hindered and they are more likely to fall prey to disease. Bone meal, preferably steamed, is an excellent fertilizer to work into the soil before setting the roots. A trowel full of ground limestone or agricultural lime is beneficial when cultivated into the soil around each plant.

Don't overlook the unusual types of irises. The tiny dwarfs are delightful in the rock garden. Many of the species lend themselves to waterside planting. The Japanese irises extend the season into July, and a new race of fall blooming irises has recently been developed. Study the catalogs of iris specialists and you will soon appreciate the advantages of this great family.

Bulbous irises are finding a hearty welcome wherever tried.

MASSES OF PEONY COLOR IN AN OHIO JUNE GARDEN

Wisely planted here, they frame the lawn and pergola effectively

JAPANESE IRISES BLOOM LATE AND EXTEND THE IRIS SEASON

With varieties now available it is possible to have irises blooming all summer

COURTESY "HOODACRES"

They are quite different from other irises and only within the last few years have they to any extent been planted in gardens. Experts who have experimented tell us that success with them demands soil especially rich in humus. They recommend planting about five inches deep, and urge that the soil be a third, by bulk, of pulverized peat moss to a depth of at least a foot beneath the bulb. This is because their fine fibrous root system in the right soil produces a better bloom upon a taller stem. These bulbous irises are exceptionally fine for cutting.

In planting bulbs, irises, or almost any type of plants in the garden, arrange them in groups, clumps or drifts rather than rows. Study your garden to learn its weak spots. Analyze every square yard of it and plan groupings that will produce as nearly a continuous display of color as possible. The weak spots of the spring garden should still be fresh in one's memory, and summer's bare spots are glaringly evident.

Besides irises, August is ideal for planting evergreens, a group of extremely useful plants that should be more generally used. They are low in cost now, but care should be taken to select varieties according to their habits of growth. Do not plant tall growing things like Norway spruce or hemlock in foundation plantings. They are entirely too vigorous for such places.

Bulbs will play a major role as you analyze and study your fall planting opportunities. In August, Madonna lilies, *Lilium candidum,* may be planted. The sooner they are in the ground the better the results. Do not plant too deep; a covering of an inch or two is sufficient. Be sure the spot is thoroughly drained. It is also well to surround these lilies with an inch of clean, sharp, coarse sand.

The latter part of August and on through September is the best season for planting narcissus. These glorious harbingers of spring are again becoming low in price and should be planted liberally. They are among the few bulbous flowers that will succeed in the shade of trees. Be sure to plant the bulbs deep enough; five inches in average soil, seven in light soils. Plant not less than six to eight inches apart, in clumps of three to a dozen or more. Closely planted, they soon crowd themselves.

Narcissus are most desirable for naturalizing. Planted in congenial surroundings they thrive and bloom for years. The ideal locations are under and among deciduous trees. Here they bloom before the leaves are fully out and make never-to-be-forgotten pictures. Quality narcissus bulbs are quite inexpensive now and should be

TULIP GARDENS ONE OF THE GAYEST PICTURES OF THE YEAR

The wise gardener has the planting of tulips in mind

planted by the thousand where the space is available.

Tulips can be planted up to the first of the year at any time when the ground is not frozen. October and November are usually considered best. Scatter clumps of them through your borders where they will make gay pictures. The best practice is to take them up each summer after their foliage dies down, planting annuals in their place. It is easy to provide a supply of annuals for this purpose, either in pots or flats, and have them in bloom when set out. There is a glorious opportunity to work out color schemes with tulips because one can know in advance just what the colors will be. Tulip varieties are well described in the catalogs, and many of the large dealers illustrate them in colors.

SINGLE PEONIES A DELIGHT

By contrast they offer attractive bloom as part of the garden

Fall is considered the ideal season to remake old lawns or start new ones, but it pays well to prepare the soil ahead of time. Spade up or plow the area and be sure it is well drained. The top surface of two or three inches should be specially prepared soil and the next three to five inches below this should contain liberal quantities of humus to aid it in retaining a reserve of moisture.

It seems very difficult for the average garden maker to realize that humus in the soil is fully as important as a supply of food. Without humus, soils dry out quickly, harden and crack open, and cannot retain moisture to develop the bacterial life so necessary to the manufacture of plant foods. A soil with sufficient humus in it is like a sponge. It holds moisture without becoming water soaked. This is the reason a well prepared layer of soil below the surface dressing is more than worth the trouble of providing it.

The top surface layer of two or three inches should be prepared by mixing, in proportion of two to one, the best top soil available with pulverized peat moss or any other form of vegetable humus. Estimate the quantity needed, mix well by passing it through a medium mesh screen and spread it evenly over the area.

Fertilizer may be mixed directly with the top dressing, or broadcast and raked in. Many combinations of plant food may be used. One is made of equal parts of steamed bone meal, raw bone meal and coarse ground bone. Steamed bone meal becomes available in about thirty days, raw in six months or a year, while coarse bone gradually decomposes and supplies food over a long period.

In all lawn making avoid cheap seed mixtures. Not only do they usually contain undesirable varieties of grass, but weed seeds are frequently present. The best seed is by far the cheapest. Many a gardener has worked years to rid his lawn of weeds introduced when the grass was planted.

Among the most important fall projects should be the planting of peonies. Spring planting, under some conditions and with roots specially cared for over winter, may be reasonably successful, but, unquestionably, with the average gardener, peonies set out in September or soon after have the best chance to thrive. Peonies are practically dormant by the last of August, but they start new growth with the advent of fall rains. Too, they are early risers and become active in the spring long before planting can be undertaken. Fall-planted, they are all ready to start. By no means disturb a peony clump in the spring; it is too much of a shock to the plant. Some of the choice kinds are so sensitive they may sulk for several years after such treatment.

There are a few general rules to be observed in planting peonies. These have great bearing upon their successful blooming through the years to come. They resent wet feet, so should not be planted in low or poorly-drained spots. Being long lived, deep rooting plants, deeply prepared rich soil is desirable. In the right soil roots will reach down three feet and more.

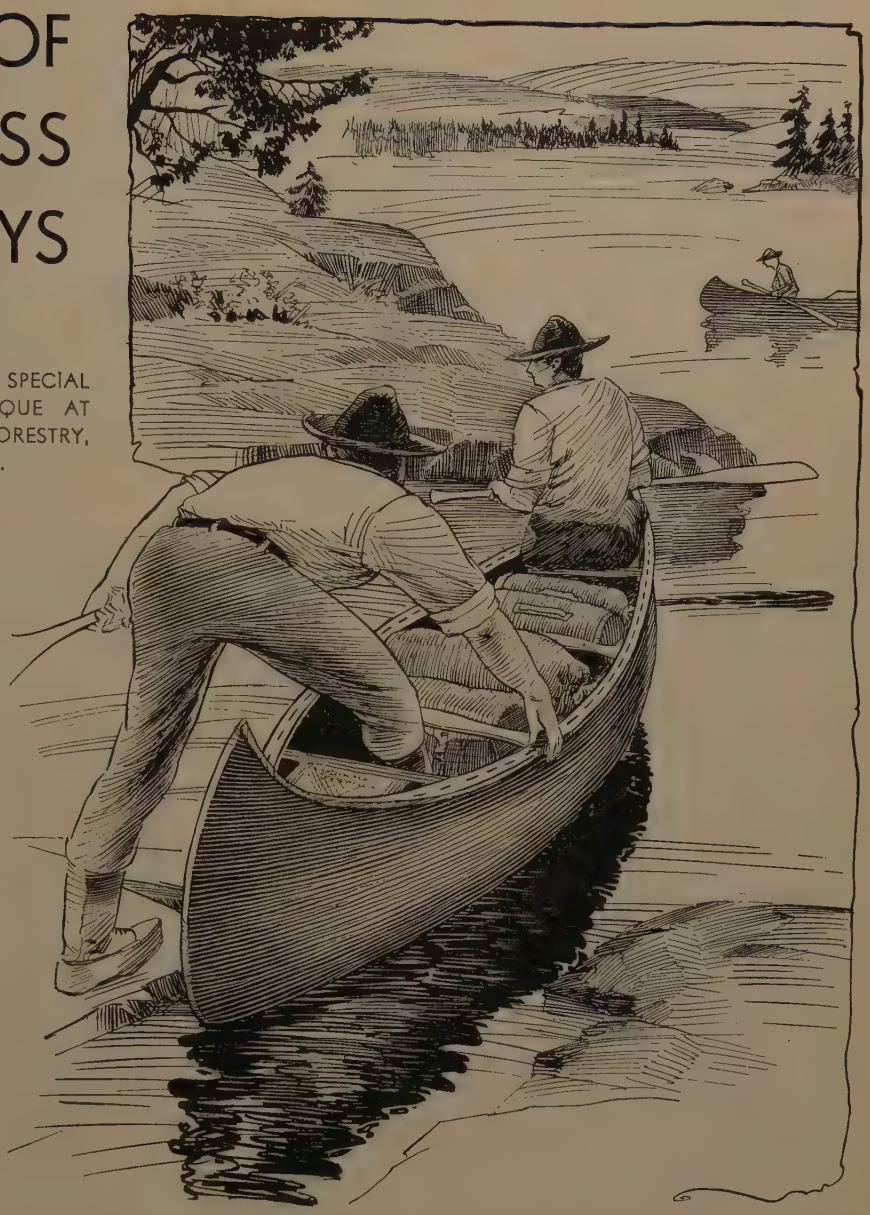
Probably the most vital single requirement is that roots should be planted at the proper depth. Too deep or too shallow planting means poor blooming. In prepared soil, thoroughly settled if possible, place the roots, with eyes or buds pointing up, and cover with two and a half to three inches of soil. Keep the soil level about them, never mounded up. The first spring after planting check up on their depth just as soon as the new shoots are above the ground by carefully working the fingers down to the roots. Fill in or remove some of the soil to have them at the right depth. You can not be too careful about this. Too, never plant a peony in a spot where peonies were previously grown. If the same location must be used, remove all soil to a depth of eighteen inches and replace with fresh soil. To do otherwise is to invite disease.

Lastly, but far from the least important, is the purchase of good varieties. Here the novice needs expert advice because not all varieties offered for sale are desirable in the garden. Peonies, like many other kinds of flowers, may easily become (Continued on page 137)

THE LURE OF WILDERNESS WATERWAYS

BY FAY WELCH

DIRECTOR, TANAGER LODGE CAMP; SPECIAL LECTURER IN CAMPING TECHNIQUE AT NEW YORK STATE COLLEGE OF FORESTRY, SYRACUSE, NEW YORK.



This is another article in the series which started in the March issue of Nature Magazine. These articles are designed to be practical and helpful to those who camp and travel outdoors under a variety of conditions, whether in the high mountains, in the desert regions, by canoe, automobile or horseback. In addition to the information contained in this series, the Camping Editor of Nature Magazine will be glad to give any further references or specific advice to our readers.

NO OTHER kind of camping has quite the same lure for me that a canoe trip possesses. Given a good canoe, staunch woods companions, just enough food and equipment, and mountain lakes where wooded islet, bay or headland tease one on, or a river slipping swiftly between silent shores and threatening every moment suddenly to reveal an unsuspected deer, or fox, or moose, or tumbling waterfall———. Let's get out the maps and pack sack and begin planning for another trip.

The surest way to set old timers arguing is to start talking about favorite pack sacks, bed rolls, jack knives, or footgear. Yet the sum total of these little oddments bulks large in the ultimate success of any wilderness adventure. Here it is my purpose to note briefly certain factors that have contributed to my enjoyment of past canoe trips.

Generally I prefer a canvas-covered cedar canoe with open gunnels, deep keel, and fairly low bow and stern. If one is traveling almost exclusively along rivers, a broad, flat, "shoe keel" is preferable. For two people and their camping equipment a sixteen footer with good bearings on the water is large enough. In fact, on several trips where individuals were not too heavy (averaging no more than one hundred forty pounds apiece) and baggage was light, we have traveled with three people and their baggage in each sixteen foot canoe. But unless the crew is composed of expert canoeists and experienced cruisers, it is safer to choose a seventeen or eighteen foot canoe for three campers and their duffel.

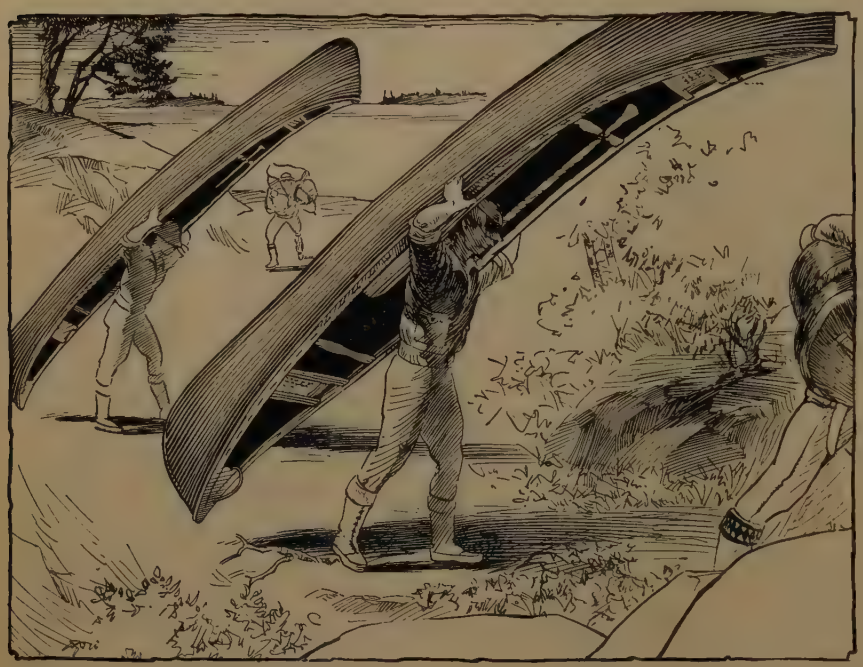
A good staunch sixteen foot canoe weighs around seventy pounds. One summer I made several long trips in a feather-weight model that, with keel, weighed only forty-eight pounds. It was a great comfort on the portages, but had to be treated like an egg shell.

Speaking of portages, only once have I ever carried a yoke. Since that time I make sure that my canoe has a thwart across the center, and then merely take along a few extra yards of stout cord or light rope. It is much easier to pack than a bulky yoke, and by lashing two paddles parallel with their blades resting on the middle

thwart and their shafts across the forward thwart, a carry can be made with as little discomfort as by any back packing method.

If possible, limit your baggage to a point where it can all be transported across the carry on one trip. This is not easy, even with three men to a canoe, as it means that two must carry the blankets and personal belongings of all three together with a fair share of the food supplies and cooking gear, while the other man totes the canoe. With only two in a canoe the problem is much more difficult, but solve it if you can, because once you start doubling on the carries every two mile portage actually becomes six and seems like ten!

Paddles should be chosen to match the size, strength and skill of the individual using them, as well as the character of the trip. A paddle that will reach from the ground to a point between the user's chin and brow is about the right length. Spruce paddles are generally preferred because of their lightness. The shaft should be straight grained and not too slender, and hold its size well into the throat, as that is where the majority of breaks occur. For river work when much shoving on stony bottom is anticipated, a paddle made of maple or white ash is preferable. On an extended trip it is well to have an extra paddle in one of the canoes.



Safety in canoeing is largely a matter of knowing how to handle your craft, combined with an awareness of its limitations. It is also necessary to understand the peculiarities of winds, waves and currents. Study your weather. Remember that the size of waves increases in proportion to the distance they run. Always take advantage of any protection offered by a point, island or shore that serves as a wind break. Above all, remember that there are winds and waves stronger than the sturdiest paddler, and that at such times the wise canoeman stays on shore.

Keep all weight low in the canoe. Endeavor to see that no baggage projects above the line of the gunnels. In paddling, the kneeling position adds to efficiency as well as safety.

Blankets and personal equipment can be stowed in pack sack, duffel bag, pack basket, sleeping bag or poncho, according to personal preference and type of trip. Each has its advocates and at various times I have tried them all. Whatever you use should be waterproof. If there are no portages, I prefer to roll my blankets and strap them inside a light, waterproof bed roll, using a small pack sack for toilet articles, flash light and extra clothing.

In spite of the fact that the Adirondack pack basket leaks unless it has a special cover, and that its lines never fit comfortably in a canoe, it is one of my favorite items of equipment. No matter how many hard, sharp cornered commissary items are packed in it, none of them can start digging you in the ribs on a difficult portage. If the pack basket is correctly shaped and well packed it carries easily, and when necessary a bed roll or even another pack can be thrown across the top of it. Articles in it are not so apt to be crushed as in a less rigid pack. On one bad mosquito night, I even pulled my pack basket over my head, drew my blankets tight around the opening and let it serve as a head net!

It is hard to say how many blankets you should take because of many variable factors, starting with you and ending with the weather. Ordinarily three medium weight blankets are enough, because unless they are very narrow, or your equatorial dimension is exceedingly large, each blanket should serve you double. If you are restless, a few blanket pins will help to hold your bed together. Remember that you need as much insulation underneath as above. If the nights prove unexpectedly cold, as nights outdoors have a way of doing, you can add to your heavy pajamas a warm sweater and a pair of heavy woolen socks. It is poor economy to sleep in any of the garments you have worn during the day. They are too damp. If it is impossible for you to sleep comfortably on the ground, an air mattress is permissible. While a comfortable bed made of balsam boughs or other suitable wild woods material is one of the luxuries of the wilderness, to make one takes considerable time and frequently is out of harmony with good principles of conservation.

Try your best to travel light. You can start economizing on your personal equipment. The following items proved adequate for me on a week's canoe trip in the Adirondacks one September, when we encountered some very cold nights. Worn: lightweight undergarments, wool shirt, sweater, knickers, belt, woolen golf socks, stout

soled moccasins with ten inch tops, felt hat. In pockets: watch, compass, jack knife, whetstone (very small), handkerchief, water-proof match box (small), note book (small), pencil, map, bird glasses (small), and pocket-book. (You might eliminate the whetstone, note book, pencil and bird glasses!) In pack: slicker (at top of pack), four blankets, two handkerchiefs, pair heavy pajamas, bed socks, extra pair woolen socks, extra shoes (low sneakers), woolen overshirt, extra knickers, bath towel, small cake soap, tooth brush, tooth paste, pocket comb and flashlight. As usually happens, I took too much. The extra knickers should have been left at home. May I remind those who think one towel, three handkerchiefs or three pairs of socks a scanty allowance that these items can be washed frequently. First aid kit and sewing kits were part of the general equipment.

Speaking of first aid kits, every camper has his own pet collection, but after using several different combinations I finally fixed on the following:

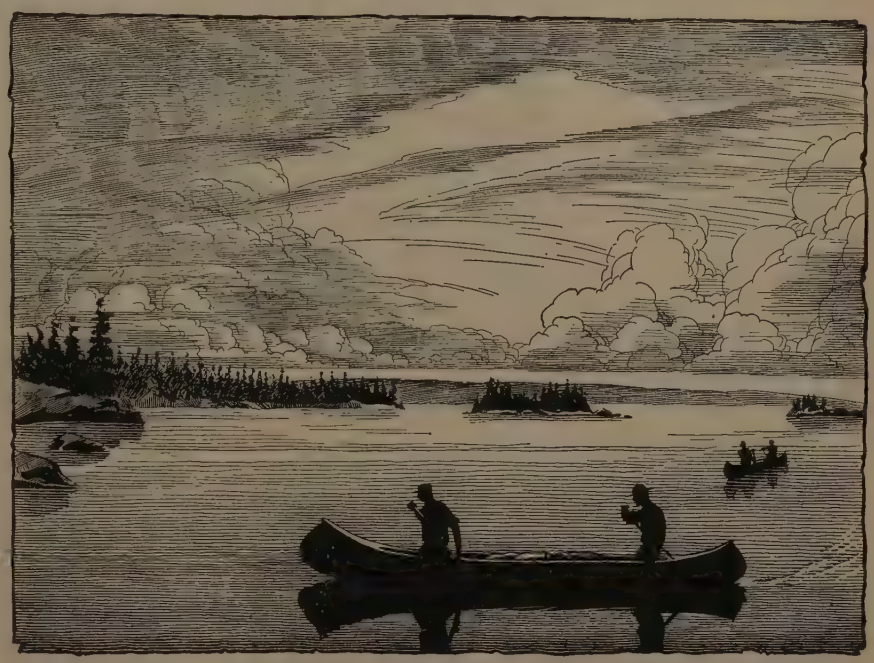
TABLETS:
- *Soda mints
- Brown's mixture
- Alkaline antiseptic
- Cascara
- Chlorozene
- *Halazone
- Aspirin

LIQUIDS:
- *Iodine
- Argyrol
- *Citronella
- Alco-wash
- *Aromatic spirits of ammonia
- *Picric acid

MISCELLANEOUS:
- Boric Acid
- Carbolated vaseline
- White vaseline
- Analgesic balm
- Ichthyol ointment
- *Gauze
- Absorbent cotton
- *Bandages (1 and 2 inch)
- *Adhesive plaster
- Applicators
- Tongue depressors
- Needle and catgut
- Scissors (bandage)
- Thermometer

*The articles starred are duplicated in a second small kit which serves for any short side trip or mountain climb, or any occasion when the party is divided. This combination has proven satisfactory on several canoe trips, although I am well aware that on my very next trip I may discover some other item that is needed badly. If we always went prepared for every possible emergency, however, I fear we would resemble a traveling drug store or field hospital!

Do not forget your axes, large trowel or small entrenching spade, toilet paper and fly dope! In fact, if the insect pests are bad it will be worth while taking a piece of mosquito netting four or five feet square which you can rig up over your head at night, or even a small mosquito tent. My favorite fly dope consists of two parts oil of citronella and one part olive oil. Others prefer mixtures whose principal ingredients are pine tar or oil of pennyroyal. Several of my friends use Mosquitone as it relieves the discomfort of previous bites while discouraging new attacks. Be sure that there is enough adhesive in your emergency kit so that it can be used as first aid for the canoe canvas. Any drinking water of questionable quality can be chlorinated by use of the Halazone tablets.



Suggestions concerning tent equipment, the selection of camp sites, the problems of camp sanitation, fire building, out-door cooking and the planning of food for a two weeks' trip will be found in next month's issue of Nature Magazine. In the meantime anyone who wishes to make a more detailed study of canoe camping would do well to read Elon Jessup's *Boy's Book of Canoeing,* published by E. P. Dutton and Company, or consult certain chapters in *Camping Out,* by Warren H. Miller, published by Appleton. Both are excellent to own.

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This series of camping articles has now been published in seven successive issues. More of seasonal nature are planned in coming months. We hope that it has been practical and truly helpful. There may be, however, readers who would like other points covered, or who have encountered certain camping problems and wonder at the best solution. We would be delighted to have any observations about the series thus far or any suggestions as to other ground that might well be covered in the future. It has been suggested that this series be republished in a handy book form. Any reactions from our readers to this idea will likewise be appreciated.

A RARE SOUTHERN LILY

BY MAY TERESSA HOLDER

A FEW miles out from Birmingham, Alabama, in the shallows of the waters of the Little Cahaba River, the *Hymenocallis coronarium* or "Bridal Crown Lily," a beautiful plant that grows only in comparatively few places in our eastern states, was recently found. It is most commonly called by florists the "Spider Lily."

These lilies commonly grow in water. The pure white blooms, with yellow anthers rising from the broad basal crown, are borne on top of the tall graceful stems, with narrow green amaryllis-like leaves that project upward from the water. The blossoms are exquisitely dainty, and long before their place of growth, in the shallows of the water, is reached, where myriads of the beautiful showy flowers thrive, their fragrance, overpoweringly sweet, and reminding many of the Tropics, pervades the atmosphere.

This plant is found in only a few places in the country among them the Chattahoochee River, near Columbus, Georgia, along the Warrior River, and in the Little Canada River in Alabama. But many thousands of these, or a similar plant, may be seen in a long marsh just after one leaves Port Limon, Costa Rica, on the way up to San José. The railroad skirts the sea on the right, and just to the left is seen the marsh of beautiful white blossoms rising out of the water, and presenting a wonderful spectacle.

Many conjectures have been made as to how these lilies came to grow in the United States away from their native habitat, assuming that their native habitat was the tropics of Central America or the West Indies, because there most of the species of the genus are found. Perhaps the seeds were transported to our shores by the waters of ancient times, because in the case of some groups of plants the present distribution seems to be explainable in no other way. Possibly migrating birds, in their yearly journeying, may have carried the seeds.

At any rate we now find the beautiful flowers of this or related species, in addition to the stations known in the eastern states from South Carolina to Florida, in the Mississippi Valley as far north as Illinois and Indiana.

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A WHITE SQUIRREL BUT NOT ALBINO

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FUNNY is a snow-white, blue-eyed squirrel which was captured in Hardin County, Texas, and has become the pet of Ethel Osborn Hill of Port Arthur. He is very lively, quite gentle, and answers to his name to the extent of running up to his owner and eating out of her hand. The Alabama Indians who have lived in the "Big Thicket" in which he was found declare that within one particular section, where Funny was taken from the wild, other white specimens have been seen. The Indians will neither capture nor kill them. It is pointed out that Funny is not an example of albinism, because he has blue, rather than pink eyes. The exact cause of his white coat is still a mystery to biologists.

In the illustration we find Funny contentedly in his cage behaving in a thoroughly squirrellike manner investigating the contents of a nut. He is not at all affected by his rare white fur or the attention it gets from visitors. Funny, in fact, is just a squirrel so far as he can see, and sees no reason for a fuss.

THE CARDINAL FIGHTS A LOOKING GLASS

ENEMIES IN MIRRORS AND WINDOWS BESET PROUD PARENT

BY GAYLE PICKWELL

THE cardinal is an aristocrat, not a plebian like the house sparrow who runs around in noisy bunches and makes his nest close to his neighbors'. He is better than that middle classer, the robin, who is content with a single dooryard to himself. The cardinal is of blue blood even as the blue-bird, and must have an entire orchard or woodlot as his own.

From his domain the red bird excludes all other red birds, driving them out with a fury such as is but rarely met with in creatures so small. So determined is he that if, perchance, his reflection meets him in a window pane, he sees, forthwith, bright red and drives at it just as at a flesh and blood cardinal. Now once—but that is my story.

Several years ago the female of the particular pair of cardinals that had taken our farm as their great estate decided to build in the trumpet creeper over the south bay window. This should have made an ideal home site, but the cardinal saw her reflection in the window, deserted her nest and gave this rival fierce battle, which she evidently felt she lost, because she nested elsewhere that spring.

Last year cardinals again built near the old farm home in a grape-covered cedar just a few feet from the house. After the home was well along the cardinal, the male bird this time, in roaming through the tree, came against a window—and smack against another cardinal!

This was too much! After having established a neat little kingdom with a palace and a royal family to have an usurper show up in the midst of it was bad business. The cardinal loudly chirped in rage. His enemy chirped also. He spread wide his tail and hit the window with a bang. The cardinal in the window spread wide his tail, too, and came right up to meet him. The window rival was a hard nut to crack and after hitting it a few more times the attacker withdrew for reenforcements and refreshments. (I wonder if he ever noticed that the other bird retreated also?)

THERE IS NO PEACE
Not a moment's rest did the cardinal have with all the rivals to fight

The next morning he was at it again, and from then on he waged war every day. He couldn't surrender, for he had a nest and family already established, and even aristocrats don't like to give up their families just because they are aristocrats.

This male worked on that one window for several days and then noticed that there was a window just above the cellar door. Sure enough, it had a rival, too. The parent bird tried his big beak on him with just the same success. Never had he met so tough a case. Eventually he found a rival in nearly every window of the house, but the cellar window was the point of his chief contention.

Those window cardinals gave that poor blueblood no peace for one entire summer. For weeks he worked on them early and late and if there hadn't been a mulberry tree handy with multitudes of ripe mulberries to carry to his young between battles the babies would have received no food from their father. As it was he would forget himself every time he passed a window and often he pounded his rivals with the mulberries he had intended to take to his family.

Just at daylight he would sound his battle bugles outside my window with "whaat, cheer, cheer, cheer" or vary it sometimes with "whudle, whudle, whudle," meaning, of course, that he thereby challenged, single handed, a world of window panes; dared them to let him at them, in fact. Then as the light grew strong enough for him to see his foe he descended to the cellar window and began chirping and whanging away.

One time we put a large mirror beneath a window. That looking-glass rival was better than the others. The beset father raged and swore even more fiercely, but the rival stayed. The second morning we moved the looking glass out on the cellar door and propped it up with a stick to try for pictures. The cardinal found it, sure enough; it was so much better than the window (Continued on page 142)

ENEMY IN THE GLASS
The worst of all the cardinals the male fought was the one in the mirror

HUNTING NET OF THE HO-HO-KAM

BY BRUCE BRYAN

BEFORE the days of the white man and his highly destructive shotguns, the primitive Indians of the Southwest found it necessary to devise some means of killing enough small game at a time to supply an entire village. The stone spear and the bow and arrow were not always adequate in obtaining such a number of jackrabbits, cottontails, gophers, roadrunners and quail. These creatures were teeming in the region formerly inhabited by the Ho-ho-kam ("Vanished People"), a prehistoric race that invaded the Lower Gila drainage in Arizona somewhere around the year one.

When a large quantity of this small game was required to supplement the agricultural products of a pueblo, a general hunt was called in which most of the village participated. Nets much similar in appearance to a modern tennis net were woven from the stripped fibers of tall yuccas or cactus. These were skillfully spread out over a wide section of ground, hung on clumps of mesquite and chaparral and camouflaged as only an Indian can disguise an object. The men and boys of the village, armed with long sticks and clubs, would form in a semicircle anywhere from half to a quarter of a mile away, facing the hidden mesh. At a given signal they would all start forward, yelling wildly and beating the underbrush on all sides as they advanced, the horns of the circle converging on the snare.

The game thus scared up from cover would flee wildly in the only direction open. Caught in the meshes of the unsuspected trap they floundered helplessly about, unable to escape, until the natives finally came up and killed them at leisure. Ranchers today employ a much similar system when rodents become too destructive of crops.

One of these ancient nets, fashioned centuries ago by some patient Ho-ho-kam weaver, was discovered recently in a cave in the Little Dragoon Mountains of southeastern Arizona. It was inside a large red olla, and when stretched out was found to measure 175 feet in length, and to be in a perfect state of preservation.

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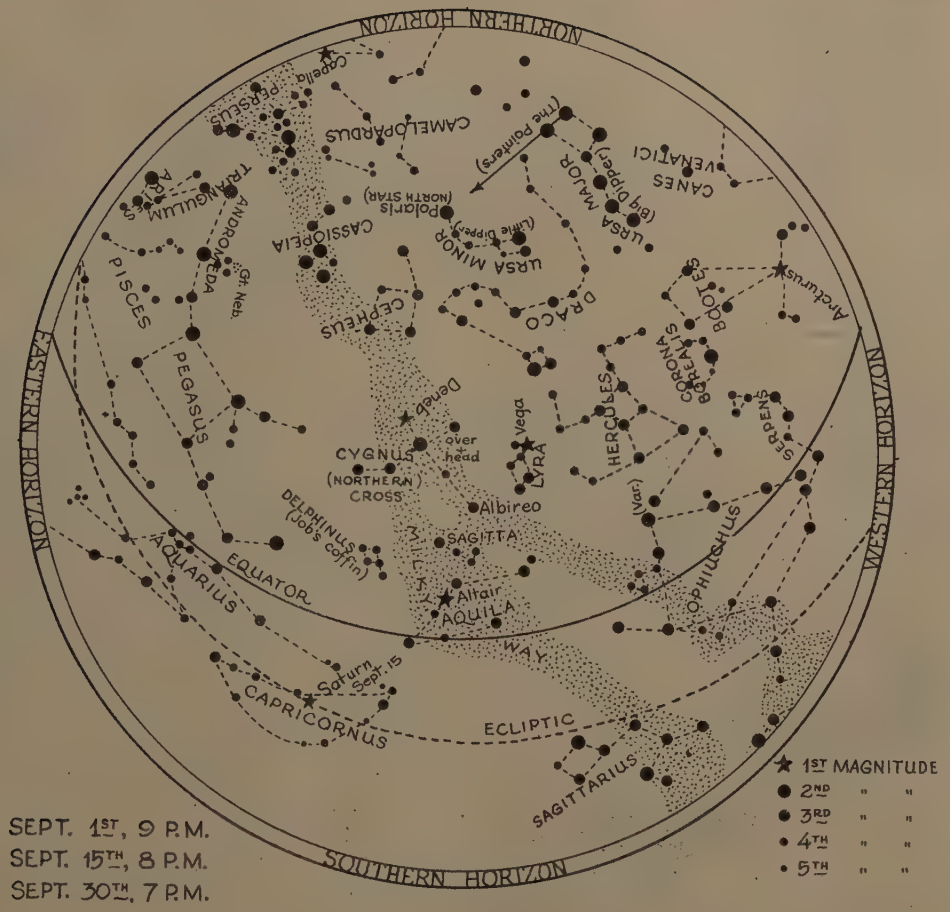
SAVING SWEDEN'S WILD FAUNA

BY HOLGER LUNDBERGH

THE LARGEST stock in the world of wisents, or European Bisons, is now to be found in Sweden. There are in all twelve animals, of which five are kept in the famous out-door museum and zoological garden, Skansen, in Stockholm, and seven in a special reserve at Ängelsberg, located not far from the capital. This stock consisted originally of but two. The seven which are kept at Ängelsberg, on the estate of Axel A:son Johnson, wealthy Nature lover, are regarded with much interest by naturalists and scientists. Attempts in other European countries to maintain herds in the near-freedom of large forest reserves have not turned out successfully. In one case two out of five wisents died, and the balance had to be returned to a zoological garden. At Ängelsberg, however, the animals have become quickly acclimatized, and are thriving under the care of Mr. Johnson's game keepers.

COURTESY SWEDISH STATE RAILWAYS

Bisons are not the only animals protected by game laws in Sweden. The moose, for instance, is safe from bullets the entire year round except for a brief open "season" of two or three days in the fall. Though many animals are killed each year, the stock is so large that there is no danger of decimation. Thus in 1932 5,740 moose were shot as compared to 5,279 in 1931. Among other animals protected in Sweden are the bear and the otter, and among the birds, the eagle and the stork.



To use this map hold it before you in a vertical position and turn it until the direction of the compass that you wish to face is at the bottom. Then below the center of the map, which is the point overhead, will be seen the constellations visible in that part of the heavens. It will not be necessary to turn the map if the direction faced is south

MOUNTAINS AND VALLEYS OF THE MOON

BY ISABEL M. LEWIS

THE MOST characteristic feature of the surface of the moon are the craters which exist by thousands and range in size from the great walled plains, a hundred miles or more in diameter, to minute craterlets appearing like mere pin pricks in the surface. There are, however, great mountain ranges and valleys on the moon, rivalling, if not surpassing in grandeur, similar formations on earth. In fact, in proportion to the size of the moon, the lunar mountains are much higher than our mountains. Although the diameter of the moon is only one-fourth that of the earth, lunar mountain peaks more than 20,000 feet in height are by no means uncommon. There are thousands of peaks over a mile high.

The mountain ranges of the moon are mostly confined to the northern half of the surface. Here we find the lunar Alps, with the Great Alpine Valley, a wedge-shaped depression which extends across the Alpine range for a distance of about eighty miles and which is from four to six miles in width. At one point it widens into what has been described as a grand amphitheatre the entrance to which is through a narrow defile about two miles wide. The view of the surrounding mountains and distant plain from within this valley must be magnificent beyond description. The finest by far of all the lunar mountain ranges are The Apennines, which include about three thousand peaks and extend in a continuous curve for a distance of four hundred miles. With the Alps and the Caucasus Mts. this range partially encloses the Mare Imbrium, one of the great lunar maria which have been likened to dried-up sea beds. The lunar Alps have many hundred peaks ranging in height from five thousand to eight thousand feet. Mont Blanc rises to a height of 12,000 feet and there is another peak nearly as high. The Caucasus, described by Elger as a massive, wedge-shaped mountain, has one peak which towers to a height of 19,000 feet, though most of its peaks are inferior to those of the lunar Alps.

Valleys on the moon vary in size and appearance

from great depressions and gorges to delicate, thread-like rills, or clefts, which resemble cracks in the surface and sometimes extend for hundreds of miles in nearly straight lines. These finer rills are to be found everywhere on the surface. Between these two extremes there are many winding valleys or ravines of moderate size, both among the mountain ranges and on the mountainous rims of craters.

There are several mountain ranges on the limb of the moon which come well into view under favorable circumstances. The Leibnitz and the Doerfel Mountains on the south limb have peaks rising to heights of 26,000 feet, and on the eastern limb are the Rook, the Cordilleras and the D'Alembert Mountains which have peaks showing in profile to heights of 25,000 feet. The heights of lunar mountains may be determined from the lengths of the shadows that they cast. Also, shortly before the sun rises upon a mountainous region of the moon, the tips of lofty mountain peaks will catch the light of the sun first and shine through the surrounding darkness as star-like points of light. If the distances of these points of light from the terminator, or line between the light and dark portion of the surface, are measured it is possible to determine the height of the mountain peak.

In addition to the great lunar mountain ranges there are numerous isolated mountains on the moon. Most of these rise from the comparatively smooth maria or walled-plains as solitary peaks, often to heights of several thousand feet. These lonely peaks are conspicuous on the many fine photographs of the moon now obtainable, as is also the wealth of detail that exists everywhere on the surface of the moon, including such features as the minute craterlets and delicate rays and rills that are often only a few hundred feet in width. The most remarkable of all photographs of the moon are those that have been taken on a large scale with the great Mt. Wilson reflector. In the amount of detail shown on the surface of the moon they are unsurpassed. These photographs will also be of great future value when questions may arise as to suspected changes in surface features of the moon.

Many craters are deep cup-shaped depressions in the lunar surface and the rims are not elevated to any extent above the surroundings. Often central mountain peaks rise from the floors of these craters. There are hundreds of such craters, fifteen miles or less in diameter. Crater ring is another name for formations of this type because they are so nearly perfect in form. Their clear-cut, new appearance gives the impression that they are of much later origin than the great mountain-walled plains and ring plains which in many cases have an appearance of great antiquity. The mountain-walled plains range in diameter from 150 miles to less than fifty miles. They are the largest crater-type formations on the surface of the moon. They are often polygonal rather than circular in shape and they are encircled by mountains of varying height often cut across by valleys or gorges. In some cases there is a well-defined circular rampart sloping gently on both sides to the surrounding surface. Again the interior plain may be greatly depressed below the surface of the moon. The floor may be rough and have on it smaller ring formations or crater-pits or it may be smooth or apparently partly filled with lava. Central mountain peaks never appear in these formations. There is another type of great walled-plain which appears very old. Their walls are old and often broken down or disintegrated in appearance. They are often found on the surfaces of the great maria or as bays in their borders and the central mountain peaks are lacking.

The ring plains are the most numerous of the crater-type formations and are different in appearance from the mountain-walled plains. In size they range from ten to sixty miles across. The surrounding ramparts are circular, massive, and broad. The outer slopes drop gently to the surrounding surface. The inner slopes descend steeply to the interior in a series of terraces which are separated by deep ravines. These terraces have the appearance of having been formed by landslips from the walls. The floors of these ring plains are greatly depressed and usually have a group of central peaks rather than a solitary central peak. Often the peaks are divided by deep valleys or open spaces. On the circular ramparts surrounding these ring plains may be found craters of various sizes and craterlets, and they are often furrowed by deep valleys. Spurs suggestive of ridges of lava often radiate from the outer slopes, fading gradually away in the surrounding plain. The noted lunar craters—Copernicus, Eratosthenes and Theophilus—are of this type and are among the finest objects on the lunar surface. They have no counterpart on earth. In fact craters of all kinds and types are unique lunar formations.

Copernicus has been called the grandest object on the surface of the moon. It stands in a solitary position in a vast plain, at no great distance from the center of the visible surface, so that all the intricate detail of its structure can be examined without much foreshortening. It has been called the monarch of the lunar ring-mountains. It is fifty-six miles in diameter and has a polygonal rather than circular outline. The walls, nearly uniform in height, are surmounted by lofty peaks, one of which stands 11,000 feet above the floor. The rugged outer slopes are crossed by many deep gorges; the inner slopes are deeply terraced. On the floor are five bright mountains and many hillocks. The region surrounding Copernicus is remarkable for its countless hillocks, craterlets on low ridges, and irregular enclosures and most particularly for its elaborate system of bright rays and streaks radiating in all directions from the crater to enormous distances. The cause of these light streaks has always been a mystery. They are associated with a number of other prominent craters, notably Tycho, which has a most remarkable system of bright rays radiating in all directions like spokes of a wheel. It is now quite generally believed that these bright rays and streaks surrounding Tycho and Copernicus and some other less conspicuous craters are deposits of some light-colored material ejected from these craters, or the numerous minute craterlets on their flanks, at the time of some violent volcanic eruption. This supplants the theory that they are splash- (Continued on page 143)

• • •

THE PUDDLE CHORUS

BY ELLSWORTH JAEGER

WHEN the South Wind softly whispers, Spring throws off her white mantle, torn and ragged, and gently awakens all the woodland. Music is everywhere. We hear it in the soft rain, the bubbling streams and the songs of birds. Even the dark, muddy puddles have their choruses. In them are little musicians in green or brown to whom Nature has given tiny bag-pipes with which to give thanks.

Filled with joy of being alive, they lustily tell the world about it. It is as merry a peeping and a piping as any Highlander ever sounded from the crags of Scotland.

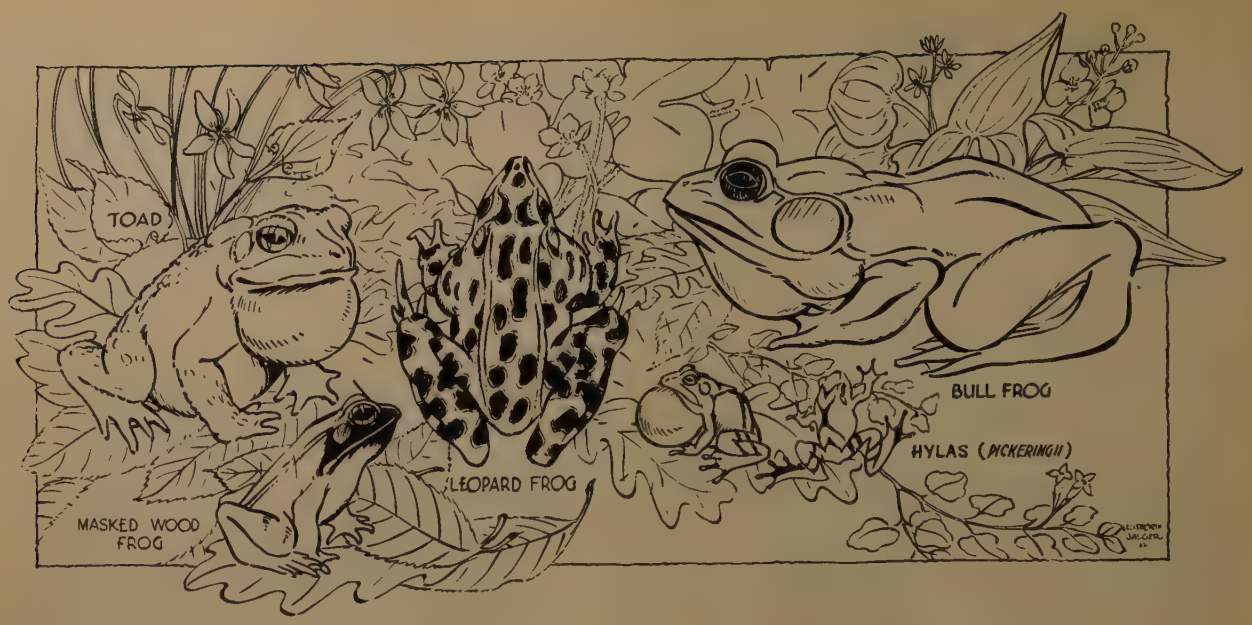
All through the awakening moons, you can hear their chorus. There are many notes. They range from the shrill bird-like peeping of the hylas to the bass "jug-o-rum" of the bullfrogs.

Their music is made by swelling their little throats until they look like small balloons, ready to burst. Their love songs bubble out with all the feeling their natures possess.

The shrill "Pe-ep! Pe-ep!" is made by one of the hylas. Some folks call him the spring peeper, a tree frog about as large as a man's thumb nail. Not satisfied with his ability as a piper, he wears a St. Andrew's cross upon his back so the world will know him for the good Scotchman that he is. He is also equipped with adhesive toes which enable him to stick to smooth surfaces.

The hop-toad, in spite of his warty look, is the best singer of the group. He has quite a range of trills. He seems to be inspired by rainy nights, and he is always at his best at such times. For centuries he has been the victim of the story that he gave warts to anyone who touched him. This is not true, and he should be looked upon with respect. He is one of our great aids in destroying insects.

Unlike other members of the chorus, the leopard frog has two song pouches. These are on either side of his throat just back of his ears. He is not always easy to know because often there is a great difference in his dress. Generally he has a bright green or brown coat with dark spots and a creamy-white waistcoat. Two prominent bronze-colored folds of skin extend from the eye to the other end of the body. He is one of the first of the frog folk to welcome Spring. He is a nomad. He has the wanderlust and goes long distances from his home pond. He is an expert broad jumper. Sometimes when taking an unusually long leap to escape an enemy he will squirt a jet of water at his pursuer. This, in all probability, is a means of



protection because the water has a very bad odor.

The masked wood frog is a neighbor of the Spring Peepers, because he is found in the woodland. He looks as though he wanted to keep his identity secret because he always wears a mask. He ranges in color from brown to fawn color with red and yellowish phases of these colors. Thus he can easily hide in the forest among the leaves.

Very early in the Spring Mr. Wood Frog will leave his long sleep under leaves or mossy logs. Then his song can be heard. He sings for the family and does this by swelling his throat and sides because he has no bag-pipes or external song pouches.

The bullfrog is the bass singer of the chorus. His sturdy voice can be heard from the fringes of small ponds and lakes. He is one of the largest of our frogs. Sometimes he measures seven to eight inches in length. His misfortune is his legs. Many folk cast hungry eyes upon them.

When acting as the cello of the swamp orchestra, not only does the bullfrog swell up his bagpipe throat like the toad, but he also uses the song pouches on his shoulders. These resemble those of the leopard frog. This, of course, adds a lot to his broadcasting ability.

These are a few of the members of this Great Batrachian Musical Company. Their concerts are always free to all who will stand quietly by and listen. The only ticket of admission is your interest.

• • •

LARKSPUR BUNNIES

BY MARTHA WOOD GREEN

Oh *what* do you think I found today
Out in my larkspur beds?
Dozens of little white rabbits, my dears,
Were showing their tiny white heads.

A spray of pink had a dozen wee beds—
In the middle of each, my dears,
A snowy white rabbit was lifting its head,
And twitching its lovely pink ears.

They are the fairies' pet rabbits, I'm sure,
Just look and you'll find them I know—
With two little ears, a black spot for an eye,
And a funny round nose white as snow!

And never a bit of harm do they do,
And never a sound they make—
Just sway in the sunshine and air, my dears,
As the breezes the larkspur shake.

When the stars come out, do they leave their nests
And with the fairy folk play
At hide-and-seek in the larkspur beds,
While the fireflies light the way?

I can not be *certain* of that, my dears,
There is only one thing I'll say—
They *look* so very wide awake,
What *can* they do but play?

GARDENING—MID-SUMMER AND FALL

(Continued from page 126)

most fascinating hobby and the connois-
eur can invest a great deal of money in
hem. On the other hand many excellent
inds are priced at a dollar or less, surely
small price for a plant which should thrive
nd bloom for several generations.

Check up on this list in catalogs of sev-
al peony specialists. They are all good
nd do well most everywhere, although the
te ones sometimes fail to open well in the
outh or during hot spells in other sections.
ractically all types and colors as well as
easons of bloom are covered by this list.

dolphe Rousseau	Mikado
lma	Mme. Jules Dessert
valanche	Nymphaea
eorgiana Shaylor	Octavie Demay
arl Rosefield	Reine Hortense
ady Alexandra Duff	Richard Carvel
ongfellow	The Bride
arie Jacquin	Tokio
arie Lemoine	Venus

New Park Head

Following the resignation of Horace M.
lbright, the appointment of Arno B. Cam-
erer to be Director of the National Park
ervice was announced by the Secretary of
e Interior. Mr. Cammerer has long been
ith the Service and takes over the direc-
rship of this far-flung activity with a back-
round of experience and proved ability.
. E. Demaray has been advanced to the
ost of associate director, the office left
acant by the new Director. Mr. Albright's
esignation, tendered to permit him to enter
usiness activities, was accepted with regret
at it terminated years of accomplishment
the Park Service.

Silver Anniversary

Congratulations to our colleague *The
uide to Nature* upon the achievement of
5 years of service to Nature. Brought out
uarterly by the Agassiz Association, Inc.,
rcAdiA, Old Greenwich, Connecticut, it
under the able and unfailing editorship
Edward F. Bigelow, who speaks author-
atively in many fields of Nature, partic-
larly in the world of bees. We bespeak
r Editor Bigelow and his paper a long
fe that will add many years to the quarter
a century now passed.

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Rose and Peony Specialists
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THE six wonderful May-flowering Tulips in this Dreer collection are considered a great improvement in size and vigor over previous introductions of similar color. Height, from 26 to 28 inches. In top-size bulbs only. *Afterglow*, deep rose with salmon pink edge; 70 cts. per doz., $4.75 per 100. *City of Haarlem*, intense vermilion scarlet; 70 cts. per doz., $5. per 100. *Melicette*, all lavender, with reflexed outer petals; 75 cts. per doz., $5.75 per 100. *The Bishop*, the purest heliotrope shade in the Darwins; $1.25 per doz., $8. per 100. *Venus*, in lovely pink tones with silvery sheen; 85 cts. per doz., $6. per 100. *Zwanenburg*, the long-wanted pure white Darwin; 85 cts. per doz., $6. per 100.

Collections of De Luxe Darwin Tulips: 3 each of the above 6 sorts, 18 bulbs—$1.15; 6 of each sort, 36 bulbs—$2.10; 12 of each sort, 72 bulbs—$4.; 25 of each sort, 150 bulbs—$7.75. All prices postpaid.

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THINGS TO THINK ABOUT

Help Needed to Suppress Baiting to Kill and Live Decoys

When, three years ago, our upper Mississippi Valley States and the Prairie Provinces of Canada to the northward were visited with a severe drought such as occasionally come to any semi-arid region, even the hunters began to wonder if the ducks and geese were really inexhaustible. This great natural breeding ground had been already seriously impaired by agricultural development; continually accelerated pursuit by an increasing army of hunters had yearly reduced the waterfowl stock; and here was the drought, wiping out thousands of breeding spots where the mother ducks were actually raising their young. Something must be done, and the country generally welcomed an open season reduced to thirty days.

But in some places where game concentrated large flocks survived the season, and many hunters found spokesmen who were willing to declare that the alarm had been needless and that a shortened season was robbing them of their just deserts. Demands for a restoration of the three months' season were insistent; to make a long story short, a two-month open season was declared.

Among the methods in common use by waterfowl hunters there are two that may be charged in no small degree with the alarming decrease in our supply. Corn and other grain is put out before the shooting stands, and the ducks and geese are shot as they come to the accustomed feeding place. Another method is to lure the birds to the guns by live birds of their own species, which are trained to call. These practices are stoutly defended; baiting is even called feeding, and asserted to be beneficial to the birds. We cannot take space to enumerate the instances where the game protection bodies and state legislatures have condemned baiting, but will merely state that a constantly growing number of organizations have come to realize that this and other deadly methods are fast exterminating the birds—and the sport.

It is generally conceded that the Federal Government has the power, by virtue of the Migratory Bird Treaty Act, to forbid baiting to kill, and in fact this power has been invoked in favor of the mourning dove. But for some reason the Government has failed to give the waterfowl this relief. Naturally some champions of our harassed wild life are working to remedy this failure, and just as naturally that veteran warrior for conservation, William T. Hornaday, of the Permanent Wild Life Protection Fund, is in the front rank. He believes that it is the business of the Federal Government to take the initiative. And he is backed in his opinion by many able conservationists, including, as we have already shown, some sportsmen.

Dr. Hornaday's latest manifesto is before us, and we are glad to reprint here such portion as our limited space allows. Of the justice and the dire need of the reforms called for we are entirely satisfied. If his warning is not heeded its reading will

A PAGE DEVOTED TO CONSERVATION FROM VARYING ANGLES

• • •

afford little comfort to the hunters a few years from now.

"Our studies have convinced us that state by state our upland game birds are reaching the vanishing point; that the often claimed 'abundance' of killable game is usually false; that all North American game birds are being killed much faster than they are breeding; that 'the sportsmen' are NOT 'saving the game,' and *never have done so;* that now nearly all state game commissions are afraid to further stop shooting; that the decent and game-saving sportsmen are only a powerless minority; that it is this year impossible for the conserving sportsmen to organize and function; that the non-migratory upland game birds will be the first to become extinct; and finally that nothing save bold and drastic work by the Federal Government, through the Department of Agriculture and strongly backed by the President, ever can or ever will SAVE the waterfowl and marsh birds on a basis of low-limit shooting confined to the annual increase.

"During the past thirty-three years, the greatest measures initiated for wild life salvage have been put over by Congress and the Federal Government. It would be a pleasure to enumerate the various Acts and Regulations—but it is unnecessary. It is enough to say that every one of those nation-wide and wholesale measures has been amply approved and sustained by the American People—even though certain drastic reforms were forced upon certain states that were too mean to make them by their own initiative.

"You have observed, in 1930 and in 1931, how two great and necessary measures were driven through desperate situations by the overwhelming force of the President, the U. S. Department of Agriculture, and about 25 supporting states. In the matter of the 30-day waterfowl open season of 1931, while 27 states registered their support in advance, four states opposed that measure, and 17 maintained stony silence regarding it. Now, it seems that no one denies the fact that that emergency movement saved some millions of birds for breeding that otherwise would have been SHOT by sportsmen!

"I am now thoroughly convinced that in view of the many different forces now actively destroying American game; in view of the well-declared and unquestionable difficulties and failures in regulated farm breeding of game to shoot; and in view of a dozen other evils now bearing down upon our remnants of game, the day has come wherein it is the duty of the Federal Government to again intervene, firmly and boldly, and put more checks upon game shooting (1) by the total stoppage of baiting game to entice it up to the guns, and (2) by the total stoppage of the use of live decoys, unfairly to lure geese and ducks down to the very muzzles of the hidden batteries of guns—'so close that it is impossible to miss.' But we will say little here about the bad sportsman ethics involved in those two killing methods, and will base our request for these two reforms upon their necessity for the preservation of adequate breeding stocks of waterfowl.

"Of course it is probable that the stoppage of those two too-deadly practices, whenever carried out, will give rise to protests from the gunners whose deadly methods are stopped. But does any criminal ever praise the law that stops his operations? Of course some of the 'shooting stands' of Massachusetts might go out of business. Of course some of the goose-selling 'clubs' of Illinois and California might be reduced. Every reform measure necessarily re-forms the objectionable practices that it seeks to abate.

"Beyond all question, less killing of waterfowl in the professional 'clubs' that now monopolize the wild flocks of certain states will have the effect of making fair shooting in thousands of other localities wherein there now is none. Shall a few persons always be permitted to monopolize the shooting privileges that belong to all the licensed sportsmen of the states concerned?

"The killing of game by the aid of baiting and the use of live decoys never will be voluntarily discontinued by the states whose hunters most extensively practice those deadly and unfair methods. As usual, the Federal Government *must act—as it had to do to reduce those bag-limits and open seasons.*"

Mallard Returns

A female mallard (No. 555414), that for each of the last 6 years has nested in a box on the roof of a barn in Nebraska, is back again this year, according to reports to the Biological Survey, United States Department of Agriculture.

This wild duck has set up a record for escaping the guns of hunters and for returning to the same spot to nest every year. She returned with almost clock-like regularity for 3 years—arriving March 12, 1928; March 10, 1929; and March 11, 1930. In 1931 she came on April 9, and last year on February 21. This year she returned to the old schedule, March 12.

This duck was banded November 29, 1927, by F. J. Keller, on his game refuge at Antioch, Nebraska, and has returned each year and nested in the box on his barn roof. She usually raises two broods of ducklings. This year the eggs were all runts, and would not have hatched, so Mr. Keller substituted a set of normal wild-duck eggs. She is known to have reared more than 100 ducks.

Officials of the Biological Survey have advanced the suggestion that should Mallard No. 555414 finally fall before a duck hunter, she be mounted and presented to Mr. Keller. Her original band, while still legible, shows the effect of the 6 years' wear, so Mr. Keller placed a new band on her other foot this spring. Now she carries two bands and the number of the new one is A604109.

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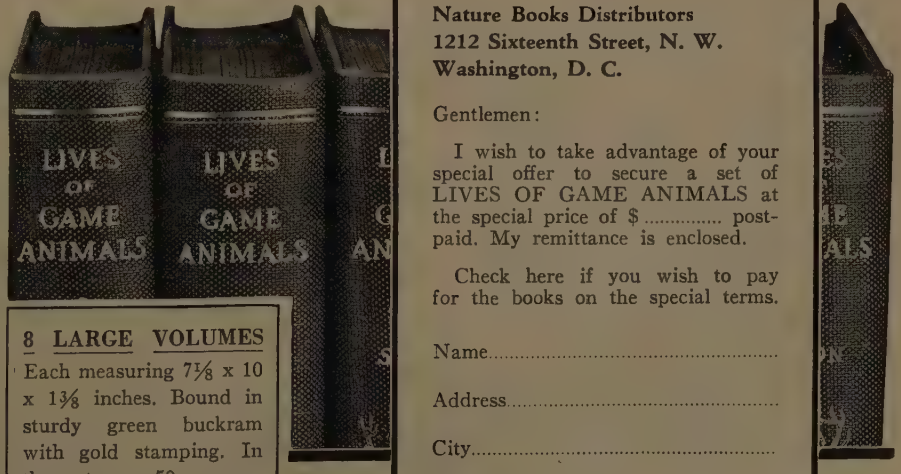

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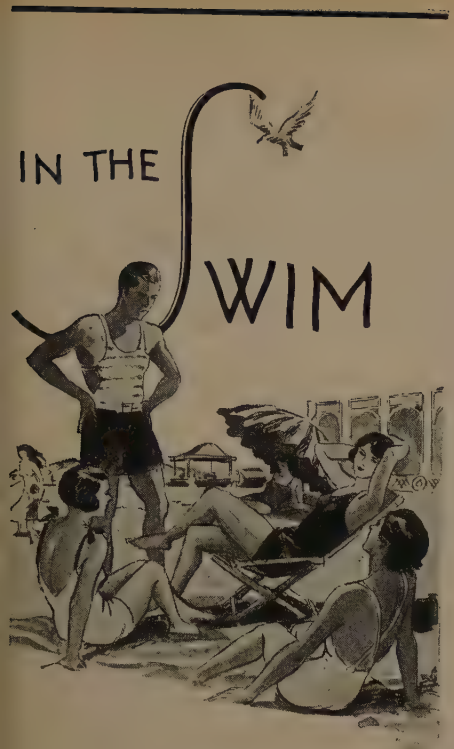

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A Correction

This is a rather belated correction of a slip made in our astronomy article of last December in which on Page 300, the last paragraph, we said that winter began December 21 "when the sun crossed the equator going south." Of course the sun was far south of the equator at that holiday season but was about to head in the other direction and all we might say in type couldn't have made it go any farther south. Mrs. Lewis feels that since she wrote the article necessarily far in advance, at the time of the autumnal equinox, it must have been one of those mental lapses we all have. And it got by all of us here at the office. We're sorry.

On Central Asia

Those interested in exploration in Central Asia should be in contact with the work of the Urusvati Himalayan Research Institute of Roerich Museum, which has just published the third volume of its researches. This publication contains an account of the work of Dr. Sven Hedin, a story of the cosmic ray expedition into southeastern Ladakh and a particularly interesting account of exploration of the Gangotri Glacier. Much interesting archaeological information on the region covered by the Institute and an exhaustive discussion of the Tibetan dialect of Lahul are also included in this latest report. The New York address of the Institute is 310 Riverside Drive, New York City.

Garden Poems

They call Si Tanhauser the "poet laureate of Long Island" because in spare moments when serving as railroad station agent at Springfield Gardens, New York, and at other times when the muse inspires, he dashes off poems. He is very much the garden lover, too, and a group of his poems has been gathered together under the title of *Songs of Horticulture*. After one has read through these simple and sincere verses one is ready to concede the poet's right to his local title. The little book is published by George Flatow, 131 229th Street, Laurelton, Long Island, New York, and sells for one dollar.

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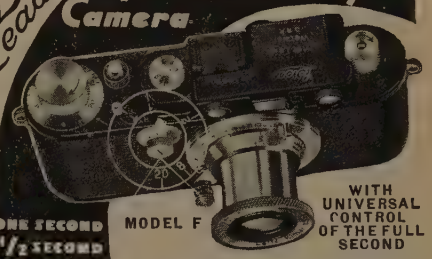

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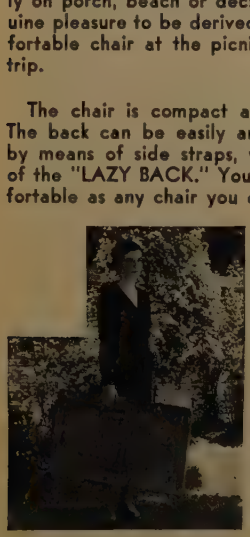

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THE CARDINAL FIGHTS A LOOKING GLASS

(Continued from page 131)

pane that the bird gave it almost his entire attention.

He worked away for awhile, swung his beak back and forth just to see if he couldn't get down to the nape of the neck of that other fellow, and finally had a bright idea. It really looked intentional, for the bird hopped along the edge of the glass and then went behind it to see if the rascally foe wasn't actually on the other side. It looked just like a baby trying to find what's behind the mirror the first time he sees himself. And just like a baby, the cardinal came back in front and stayed there. It was only from the front that he could say all of his mean things face to face.

A day or two later the cardinal's children left the nest and then the father could give up his kingdom to his unconquerable looking-glass rivals with a good face. But even now, I hear, he comes back once in awhile to look over his old territory and he never leaves without a tilt or two with the window panes.

Bird Annual

That the ranks of the ornithologists will be ably filled by new and young blood is indicated by the appearance and contents of *The Heron,* the annual bird publication of the Woodmere Academy Bird Club. The annual this year is a 48-page booklet. There is an excellent article based upon a survey of the bird life of Cobb's Island, Virginia, by Benjamin C. Berliner. Richard Weil has compiled a fine history of the least terns of the Atlantic Coast, and Daniel Berolzheimer, Roger Loewi and Thomas Vogel write of the birds of Penobscot Bay, Maine; Mill Neck, Long Island and New Hampshire respectively. There is also the Club's Christmas bird census and other records, as well as brief observations of interesting nature by Robert Arbib, David D. Harrower and others. The publication speaks for the abilities and sincerity of the club members.

Saving Shrubbery

You can keep cats and dogs away from evergreens and other shrubs or plants very simply and easily according to an announcement recently made by the United States Department of Agriculture. Just mix one to two tablespoonfuls of "Black Leaf 40" in a gallon of water and spray the evergreens, shrubs or flowers which are bothered. The odor of the "Black Leaf 40" is offensive to dogs and cats and they will pass them by when spraying has been done. Here is a simple, inexpensive method of protecting many thousands of dollars worth of evergreens.

White Buffalo

Among the group of some seventy-five young born this year on the Bureau of Biological Survey's national bison range in Montana there was one albino calf. Even when millions of buffalo lived on the great plains, a white one was rare. It is estimated that this freak occurs about once in five million, and Dr. W. T. Hornaday expresses the belief that not more than ten or eleven white buffalo or their skins have been seen by white men. They were highly prized by the Indians as "big medicine."

CHOOSING A SCHOOL

By Richard Deshon

Director, School Service
Nature Magazine

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Most of the better boys' schools now charge between $1200 and $1400. A few are more expensive. There are excellent schools for $1000 and a few for less. Girls' schools come generally within the same price range. There are a few good boarding schools preparing efficiently for college at less than $800. This year many of the best schools offer scholarships.

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MOUNTAINS AND VALLEYS OF THE MOON

(Continued from page 134)

ngs due to the impact of giant meteor-ites with the surface of the moon in far distant ages when such masses occurred in far greater numbers than they do today. Attention has been called by some selenographers to the fact that some of the mountain-walled plains and great ringed plains encroach upon one another or lie in chains or rows. There are also many instances of double or twin craters of all kinds and sizes which resemble each other closely and so suggest a contemporary origin. It is difficult to see how such formations could arise from the impacts of meteors. Rows of small craterlets and minute crater-pits are also common and evidently are of volcanic origin.

Since there is neither air nor water now on the surface of the moon there is no erosion and all mountains are sharp and rugged in outline and unclothed with vegetation of any kind. Volcanic action on a great scale has ceased, although there is reason to believe that there may be a quiet emission of volcanic fumes and vapors on a small scale from volcanic vents or craterlets and crater cones that might in general escape detection. There are some indications that such action may be taking place. Comparison of photographs of the moon taken some years apart will reveal any changes that may take place on the lunar surface affecting an area as small even as a square mile. Although there is no erosion on the surface of the moon due to air and water there are great extremes of temperature occurring in every revolution

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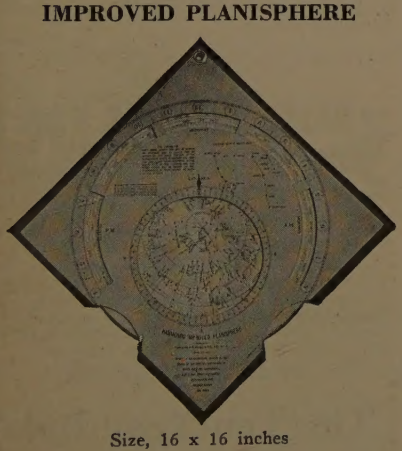

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of the moon around the earth, which may affect the surface features in time. The length of the lunar day is the interval from new moon to new moon, about twenty-nine and one-half days. Half of this time the sun never sets at any one point on the surface but shines in a cloudless sky with an intensity that according to recent observations of Pettit and Nicholson at Mt. Wilson rises to 134 degrees Centigrade at full moon at a point directly under the sun, or 34 degrees above the boiling point of water on the earth. At the limb at quarter phase the temperature drops to 81 degrees C. The temperature at lunar midnight drops to minus 153 degrees C. It was also found that fifty-two percent of the solar energy is reflected. This alternation of extremes of heat and cold is certain to have some effect upon the rocky crust of the moon and should in the course of time produce a gradual disintegration of the surface rocks. As we view it today, however, the moon appears to be a dead and changeless world.

In September's evening skies Jupiter and Mars are now too close to the sun to be seen to advantage. Jupiter will be in conjunction with the sun on September 27 and Mars is only about 15 degrees above the southwestern horizon at sunset. Venus is now a brilliant object in the southwest immediately after sunset. On September 15 it sets about one hour after the sun. Saturn is in Capricornus and is low in the southeast at sunset. It will be visible all night. Mercury cannot be seen to advantage this month. It is in the morning sky until September 12 when it is in superior conjunction with the sun.

The Northern Cross in Cygus, and Vega in Lyra, are now overhead at nine P.M., September 1. The Great Square in Pegasus and Andromeda are high in the east at the same time. Arcturus in Bootes is dropping toward the western horizon followed by Corona. Hercules is still high in the western sky. Scorpio is now disappearing in the southwest but Sagittarius is still conspicuous in the southern sky. The first magnitude star Fomalhaut, in the constellation of the Southern Fish, rises in the southeast about this time. It lies south of the large but rather inconspicuous constellation of Aquarius, The Water-bearer.

On September 23, at 7:01 A.M., the sun will cross the equator going south and autumn will begin.

Humane Trap Prizes

First prize of $150 was awarded in the class of traps catching animals alive and unhurt to Charles L. Hancock, Tuthill, S. D. by the American Humane Association in this year's humane trap contest. First prize for a trap which will hold without injury went to Emil Zurian of Moquah, Wisconsin.

Grand Canyon Junco

Indicative of the value and interest of bird banding is the experience with a red backed junco reported by E. D. McKee, Park Naturalist of Grand Canyon National Park. One of these birds banded on December 16, 1932, at the station on the South Rim, on April 20, 1933, obligingly walked into a banding trap at Bright Angel Point on the North Rim. This is the first definite cross-canyon bird record.

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